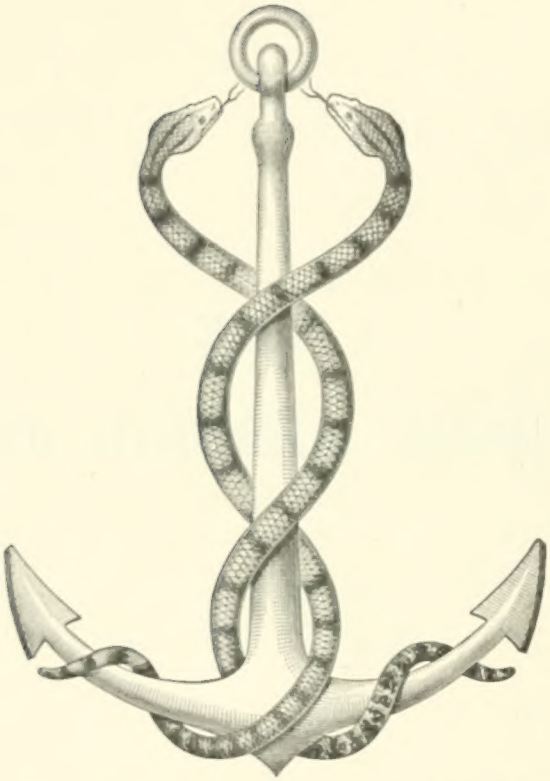
THE
EDINBURGH MEDICAL JOURNAL.



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THE EDINBURGH MEDICAL JOURNAL

EDITED BY

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AND

HARVEY LITTLEJOHN, M.B., F.R.C.S.Ed.

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THE

EDINBURGH MEDICAL JOURNAL.

MEDICAL EDUCATION IN THE UNITED KINGDOM.

I. Education in General.

Before describing the requirements imposed upon all those who desire to obtain a degree or diploma with the right to practise medicine and surgery, a word may well be said about the important questions—Which degree or diploma to work for? and which teaching institution to attend? There are three courses open to the aspirant to medical honours. He may enter a university which affords education as well as confers degrees; he may study at certain medical schools, and take his degree at a university which does not possess a teaching staff; or he may enter for one of the licences to practise granted by certain medical bodies. A university degree has certainly greater credit associated with it, but now that a minimum course of study, lasting for at least five years, and including a large number of compulsory classes, has been made obligatory upon all graduates and licentiates alike, the difference between the instruction provided by the universities and by the different medical schools is not so great as formerly.

The usual sum for the class and degree fees spread over the five years is about £150 to £160, when necessary extras are included. The table on the following page gives approximately the minimum cost of obtaining the different degrees and diplomas.

The fees at the different London hospitals can be compounded for by one or two payments, the sum of which is less than the total if paid by annual instalments. The curriculum for the London Colleges' diplomas costs from £110 to £158, exclusive of the examination fees. Several of the London Colleges give substantial rebatements to sons of registered medical men. If the London University M.B. course is taken, the cost is somewhat greater. The degrees of the Scottish Universities cost, with the examination fees, from £115 to £145; the licence of the Scottish Colleges, from £115 to £130.

Through the munificence of Mr. Andrew Carnegie, the cost of academic training has been lessened by the payment of the educational fees in the case of students of Scottish nationality, and also of those who have attended at any scholastic institution under the inspection of the Scotch Education Department, of whatever nationality, during at least two years after the age of 14, provided application be properly made for the same. Mr. Carnegie has given £2,000,000 as capital for a fund for this purpose, the interest to be employed as above, in the hope that only those who require help will apply, although no questions as to circumstances are asked from any claimant.

The Carnegie Trust for the Universities of Scotland is controlled by an Executive Committee, with chambers at 14 Hanover Street, Edinburgh. Forms of application, either for university or extra-mural students, may be obtained by writing to the Secretary at the above address.

TABLE I.—*The Approximate Cost of Curricula.*

	Diplomas.	Class Fees.	Examination Fees, etc.	Total.
1. TEACHING UNIVERSITIES.				
Edinburgh	M.B., Ch.B.	£115 0	£28 7	£143 7
Glasgow	M.B., Ch.B.	97 13	28 7	126 0
Aberdeen	M.B., Ch.B.	90 0	23 2	113 2
Dublin	B.A., M.B., B.Ch., B.A.O.	207 12	27 0	234 12
Durham	M.B.	115 0	26 0	141 0
,,	M.B., B.S.	115 0	31 0	146 0
Victoria University	M.B., Ch.B.	138 6	17 0	155 6
Birmingham	M.B., B.Ch.	148 19	21 0	169 19
Oxford	B.A., B.M., B.Ch.	165 0	30 0	£165–£220
Cambridge	M.B., B.C.	150 0	20 0	£150–£200
2. NON-TEACHING UNIVERSITIES.				
London	M.B., B.S.	£150 0	£17 0	£167 0
Royal, Ireland	M.B., B.Ch., B.A.O.	145 0	17 0	162 0
3. LICENSING BODIES.				
Conjoint Scottish Qualification	L.R.C.P.E., L.R.C.S.E., and L.F.P.S.Glasg.	£90 0	£30 0	£120 0
Conjoint English Qualification	L.R.C.P. Lond., and M.R.C.S. Eng.	£90–£120	36 15	£126–£156
Society of Apothecaries	L.S.A.	£90 0	15 0	£105 0
Conjoint Irish Qualification	L.R.C.P.I., and L.R.C.S.I.	135 0	42 0	177 0
Apothecaries' Hall	L.A.H.	90 0	22 1	112 1

At the provincial medical schools in England the expenses for the London Colleges' diploma are about the same sum at University College, Sheffield; £123 at University College, Bristol; £125 at the University College, Liverpool. For the London University degree, £25 will require to be added to cover the fees for classes necessary for the Preliminary Scientific Examination.

In Ireland, the Dublin University only confers the M.B., B.Ch., B.A.O. degree on Bachelors in Arts; the cost therefore is considerably higher than elsewhere. The expense incurred while working for the Irish diplomas comes to about £140 in Dublin, but is much less than this at any of the Queen's Colleges, whether at Belfast, Cork, or Galway. The degree of the Royal University of Ireland costs £165 at the Catholic University School of Medicine in Dublin; the diploma of the conjoint colleges, £166.

The fees for lectures and examinations, therefore, vary from about £115 to £200; and, adding the cost of books, instruments, and club subscriptions for the five years, say £30, and of maintenance during thirty-nine weeks each year, £300, we get a total expense, solely connected with the curriculum, of from £445 to £530. This estimate is the utmost minimum; in most cases a sum of £1000, or over it, will be spent in the five years.

II. The Regulations of the General Medical Council, binding on all those entering upon the Five Years' Course of Medical Study, constituting the Minimum Course allowed for Graduation or Licence.

A. *Preliminary Examination and Registration.*

Before any one can register as a medical student, from which the commencement of his five years' course is calculated, he must be sixteen years old and pass a preliminary examination in the subjects of general education, or an examination recognised by the General Medical Council as equivalent to it. (Cf. Table II., pp. iv.–vii.)

A preliminary examination certificate is only accepted by the Council as entitling to registration, provided that it certifies that all the required subjects have been passed at one and the same time.

The student now enters his name on the books of a university or college, receives a certificate to this effect, and forwards the certificate, along with that for the preliminary examination, and a form of application for registration in the books of the General Medical Council (to be obtained from the registrars of the Council), filled up according to the instructions printed on it, to the registrar of the Branch Council for the district in which his school is situated. If this is not done within *fifteen days* from the commencement of a session, the classes taken during that session will not be recognised as qualifying for graduation. (For the names and addresses of the registrars, see p. xxiii.)

B. *Professional Education.*

The student is now officially recognised as having commenced the professional study of medicine, and is required to spend at least five years over it, of which the last year must be devoted to clinical work. Before he can enter for any of the examinations, he must produce certificates, not only to show that he has attended

the necessary classes, and paid the necessary fees, but that he has given satisfaction to his teachers by his conduct, and taken part in the class examinations held during the sessions. The minimum attendance on classes which constitutes an *annus medicus* is fixed at two courses of lectures during each session, or one course of lectures and hospital practice.

Graduates in Arts or Science of any university recognised by the Medical Council, who shall have spent a year in the study of physics, chemistry, and biology, and have passed an examination in these subjects for the degrees in question, shall be held to have completed the first of the five years of medical study.

TABLE II.—*List of Examining Bodies whose Examinations in General Education are recognised by the Medical Council as qualifying for Registration as Medical or Dental Student.*

Testimonials of proficiency granted by educational bodies, according to the subjoined list, will be accepted by the Council, which reserves the right to add to or take from the list.

A Degree in Arts of any university of the United Kingdom, or of the colonies, or of such other universities as may be specially recognised from time to time by the Medical Council, is considered a sufficient testimonial of proficiency.

I. UNIVERSITIES IN THE UNITED KINGDOM.

Universities of Oxford, Cambridge, and Durham :—

(1) Junior Local Examinations (certificate to include all the required subjects at one time).
(2) Senior Local Examinations (certificates to include the required subjects).
(3) Responsions (certificate to be supplemented by others showing that the required mathematical subjects have been passed). Oxford.
(4) Moderations (certificates to include the required subjects). Oxford.
(5) Final Examination for a Degree in Arts.
(6) Higher Local Examinations (certificates to include the required subjects). Cambridge.
(7) Previous Examination (certificates to include the required subjects). Cambridge.
(8) General Examination (certificates to include the required subjects). Cambridge.
(9) Examination for Certificate of Proficiency (certificate to include all the required subjects at one time). Durham.
(10) Preliminary Examination in Arts for Graduation in Medicine and Science (certificate to include the required subjects). Durham.

Universities of London, Birmingham, and Wales, and Victoria University:

(11) Matriculation Examination (certificate to include the required subjects). London.

(12) Final Examination for a Degree in Arts or Science. London, Wales, Victoria.
(13) Preliminary Examination (certificate to include all the required subjects at one time). Victoria.
(14) Entrance Examination in Arts (certificate to include all the required subjects at one time). Victoria.
(15) Matriculation Examination (certificate to include all the required subjects at one time). Birmingham, Wales. Birmingham also has 1, 2, 3, 7, *supra*.

Universities of Edinburgh, Aberdeen, Glasgow, and St. Andrews:
(16) Junior Local Examination (certificate to include all the required subjects at one time). Edinburgh and Aberdeen.
(17) Senior Local Examination (certificates to include the required subjects). Edinburgh and Aberdeen.
(18) Preliminary Examination for Graduation in Medicine and Surgery (certificate to include the required subjects).
(19) Preliminary Examination for Graduation in Arts or Science (certificate to include the required subjects).
(20) Final Examination for a Degree in Arts or Science.
(21) Final Examination for the Diploma of L.L.A. St. Andrews.

University of Dublin:
(22) Public Entrance Examination (certificate to include the required subjects).
(23) Examination for the First, Second, Third, or Fourth Year in Arts (certificate to be signed in the approved form by the medical registrar of the university).
(24) Final Examination for a Degree in Arts.

Royal University of Ireland:
(25) Matriculation Examination (certificate to include the required subjects).
(26) Final Examination for a Degree in Arts or Science.

Oxford and Cambridge Schools' Examination Board:
(27) Lower Certificate (to include all the required subjects at one time).
(28) Higher Certificate (certificates to include the required subjects).

II. MEDICAL LICENSING BODIES.

Royal Colleges of Physicians and Surgeons in Ireland:
(29) Preliminary Examination (certificate to include all the required subjects at one time).[1]

III. EDUCATIONAL BODIES OTHER THAN UNIVERSITIES

College of Preceptors:
(30) Examination for a First-Class Certificate or Second-Class Certificate of First or Second Division (to include all the required subjects at one time).

[1] Recommended to be discontinued.

(31) Preliminary Examination for Medical Students (certificate to include all the required subjects at one time).

Scotch Education Department:

(32) Examination for Lower Grade Leaving Certificate (to include all the required subjects at one time).

(33) Examinations for Higher Grade or Honours Leaving Certificate (to include the required subjects).

Educational Institute of Scotland:

(34) Preliminary Medical Examination (certificate to include all the required subjects at one time).

Intermediate Educational Board of Ireland:

(35) Junior or Middle Grade Examination (certificate to include all the required subjects at one time).

(36) Senior Grade Examination (certificates to include the required subjects).

Central Welsh Board:

(37) Senior Certificate Examination.

IV. INDIAN, COLONIAL, AND FOREIGN UNIVERSITIES AND COLLEGES.

Universities of Punjab and Allahabad:

(38) Intermediate Examination in Arts.

Universities of Malta; Bombay; Madras; M'Gill College and Bishop's College, Montreal; Fredericton, New Brunswick; Toronto; Trinity and Victoria, Toronto; Queen's, Kingston; Western, Ontario; Mount Allison College, New Brunswick; King's College, Nova Scotia; Dalhousie, Halifax; Melbourne; Sydney; and Cape of Good Hope; and the Colleges of Quebec; Trinity, Toronto; Ontario; and New Brunswick:

(39) Matriculation Examination.

Ceylon Medical College; Universities of Manitoba, Otago, and New Zealand; and the Medical Boards of Nova Scotia and Newfoundland:

(40) Preliminary Examination.

Universities of Madras, Calcutta, Sydney, and Adelaide:

(41) First Examination in Arts.

Universities of Sydney, Adelaide, and Tasmania:

(42) Senior Public Examination.

Codrington College, Barbadoes:

(43) Arts Examinations at Durham University.

Continental Bodies:

(44) The German Abiturienten-Examen of the Gymnasia and Real-gymnasia; Examinations entitling to the French Diplomas of Bachelier ès Lettres and Bachelier ès Sciences, and other corresponding Entrance Examinations to the Universities.

Egyptian Government:

(45) Secondary Education Certificate.

(*a*) No certificate from the bodies in the foregoing section (IV.) is accepted unless it shows that the examination has been conducted by or under the authority of the body granting it, includes all the subjects required by the General Medical Council, and states that all the subjects of examination have been passed in at one time; and copies of the form of the required certificate are supplied by the registrar of the Council for the purpose.

(*b*) In the case of natives of India or other Oriental countries whose vernacular is other than English, an examination in a classic Oriental language may be accepted instead of an examination in Latin.

The Subjects in which Courses are required of all Candidates by the General Medical Council.

In every course of professional study and examinations, the following subjects must be contained:—

(1) Physics, including the elementary mechanics of solids and fluids, and the rudiments of heat, light, and electricity.
(2) Chemistry, including the principles of the science, and the details which bear on the study of medicine.
(3) Elementary biology.
(4) Anatomy.
(5) Physiology.
(6) Materia medica and pharmacy.
(7) Pathology.
(8) Therapeutics.
(9) Medicine, including medical anatomy and clinical medicine.
(10) Surgery, including surgical anatomy and clinical surgery.
(11) Midwifery, including diseases peculiar to women and to new-born children.
(12) Theory and practice of vaccination.
(13) Forensic medicine.
(14) Hygiene.
(15) Mental disease.

It is to be understood, as regards the above-mentioned subjects, that the Council offers no opinion as to the manner in which the subjects should be combined or distributed for purposes of teaching or examination.

TABLE III.—*Details of the Curriculum required by the various*

(Minimum Age in all, 21 years ;

	Subjects or Courses Required.																
	Languages (Latin, Greek, Modern Languages, Logic, Mathematics)	Chemistry	Practical Chemistry	Botany	Zoology	Physics	Practical Physics	Anatomy	Practical Anatomy	Physiology	Practical Physiology	Practical Histology	Materia Medica and Therapeutics	Practical Pharmacy	Pathology	Practical Pathology	Post-mortems
SCOTLAND.	Years.																
M.B., Ch.B. Universities of Edinburgh, Glasgow, Aberdeen, St. Andrews	4	6	3	3	3	3		6	12	6	3		6	25 hours or 3 mths.	6	3	3 mths. (3 mth. course)
F.P. and L.R.C.S.E. (L.F.P.S. college and Scotch Colleges)		6	3		3	3		6	12	6	..		3	3	3		3
ENGLAND.																	
[illegible] University, M.B. B.S.	—	C.	C.		C.	C.		6	12	6	..	..	C.	C.	C.		C.
[illegible] University, M.B. B.S.	4	6	3		3	3	3	12	12	6	3	3	3	3	3		25 (sect.)
[illegible] University, M.B. B.S.	3	6	3		3	6	3	6	15	6	C.	..	3	C.	6	C.	12
[illegible]ngham University, M.B. B.Ch.	3	6	3		6	6	3		9	6	3		9	3	6	3	12 mths.
[illegible] (Oxford[1] and Cambridge) M.B. B.Ch.	[illegible]	C.	C.		C.	Course		C.	6	6	..	..	C.	C.	C.	..	C.
F.P. Lond.; and M.R.C.S. [illegible] London Colleges		6	C.		C.	6	..	6	12	C.	6		3	3	3		12
[illegible] London, Society of Apothecaries	—	6	3		3	—	—	6	12	6	—	3	6	3	3	—	C.
IRELAND.																	
[illegible]in University, B.A. M.B., Ch., B.A.O.	4	6	3	3	3	C.	—	6	12	12	..	3	3	..	6	3	3
[illegible]l University, Dublin, B., B.Ch., B.A.O.		6	3	3	3	3	—	12	12	12	3	—	3	3	3	3	6 (sect.)
[illegible] P.I. and L.R.C.S.I. [illegible]sh Colleges	..	6	3	..	3	3	..	6	12	6	..	3	3	3 or 3 yrs. apprentice.	..	..	30 mtgs.)

Figures represent months unless

[1] The Oxford degrees are only conferred on those holding the B.A. degree of the University ; the details of the

Universities and Licensing Bodies for Degrees or Diplomas.

length of Course, 5 years.)

WITH LENGTH OF ATTENDANCE.

Medical Jurisprudence and Public Health.	Medicine.	Clinical Medicine.	Surgery.	Clinical Surgery.	Operative Surgery.	Regional Anatomy.	Midwifery and Diseases of Women.	Diseases of Women.	Labour Cases, or Practical Midwifery.	Hospital Practice.	Dispensary.	Mental Diseases.	Infectious Diseases.	Ophthalmology.	Diseases of Children, or Laryngology.	Clerk and Dresser in Hospital.		Vaccination
										Years.		Meetings.				Med.	Surg.	
3	6	9	6	9	C.	..	6	..	12 cases or 3 mths. and 6 cases	3	6	16 16 C. C.	12 10 3 mths. C.	24 20 3 mths. C.	18 (optional) 3 mths.	6	6	
3	6	0	6	9	..	..	3	..	20 cases or 3 mths. and 6 cases	2	6	13	13	13	..	Certificate.		
												Mths.	Months.	Months.				
Course.	6	24	6	24	.. C.	.. ..	C.	..	20 cases	4	6	2	2	..	..	..	..	
3 C.	12	18	12	18	.. C.	.. C.	3	..	20 "	4	..	3	20 cases	..	..	6	6	C fi
3 3	12	24	6	24	.. 6	.. ..	6	3	20 "	2	..	C.	C.	..	..	6	6	
3 6	12	18	12	18	3	3	6	3	20 "	3	..	3	3	3	..	6	6	
C. C.	6	C.	6	C.	C.	..	C.	..	20 "	3	..	C.	3	..	..	6	6	
3 3	6	9	6	9	C.	..	3	12 mtgs.	20 "	2	6	C.	C.	3	..	6	6	
3 3	6	9	6	9	C.	..	6	..	20 "	3	..	3	3	3		6	6	
										Mths.								
3 ..	6	27	6	27	3	6	6	..	6 mths. 30 cases	27	..	3	C.	3	..	..	..	
3 3	6	33	6	33	24 mtgs.	..	6	..	6 mths. 20 cases	33	..	3	10 cases and 3 mths.	3	..	3	3	I mt
3 ..	6	27	6	27	30 mtgs.	..	6	..	6 mths. 30 cases	27	..	3	C.	3		..	..	Ce ca

otherwise stated. C. = Course.

curriculum required differ in many respects from the others, and may be obtained from the University Authorities

TABLE IV.—*Table of Universities, Medical Schools and Institutions, with the Dates for Preliminary Examinations and Sessions*, 1905–1906.

	Preliminary or Matriculation Examination.		Sessions. Winter.	Spring.	Summer.
ENGLAND AND WALES.					
London University	Jan.	June. Sept.			
The Royal College of Physicians, London; and Surgeons, England	Oct. Jan.	April. July. (Coll. of Preceptors.)			
London Hospitals: Guy's	As in last two		Oct. 2.		[illegible] May
St. Bartholomew's					
St. Mary's					
Westminster					
London					
Middlesex					
St. George's					
Charing Cross					
St. Thomas's					
King's					
University					
PROVINCIAL.					
Durham University	Sept., Jan., March.				
University of Liverpool	June and September.				
Victoria University, Manchester					
University of Birmingham	June and September.				
University College, Bristol					
University College, Sheffield					
University of Leeds	...				
Universities of Wales: University College, Bangor	Local Examinations by College of Preceptors, etc.				
" " Cardiff					
" " Aberystwyth					
SCOTLAND.					
Universities of Edinburgh	Sept. 25.	March.	Oct. 17.		May.
Glasgow			" 19.		April.
Aberdeen			" 16.		
St. Andrews			" 16.		
Edinburgh School of Medicine	Sept. 11.	March.	" 17.		May.
University College, Dundee	Sept. 25.	March.	" 16.		April.
St. Mungo's College, Glasgow	Sept., April, July.		" 19.		
Anderson's College, Glasgow			" 19.		
IRELAND.					
Dublin University	(B.A. Degree.)		" 2.		May.
Royal University of Ireland	Sept. 21.	June.			
Conjoint Colleges	"	March.	" 2.		April 1.
Catholic University	"	"	Nov.		
Queen's Colleges: Galway	Oct., Nov.		Oct. 20.		May.
Cork	"		" 23.		
Belfast	"		" 17.		

C. Single Qualifications not conferring in themselves the Right to Register.

Many of the colleges confer degrees or diplomas on members of the profession who already possess a registrable qualification. The M.B. of London and Durham Universities allows the holder to practise, while the examination for M.B. at Oxford and Cambridge is the same as that for B.C.

Owing to the limited space at our disposal, it is impossible to enter into any details as to the conditions under which these degrees and diplomas are given, especially as they appertain to graduates who hardly require information about them. All the universities confer degrees of Doctor of Medicine and Master in Surgery on their graduates, only imposing as a condition that a longer or shorter interval shall elapse between graduation and the grant of the higher degree. Generally, the candidate has to present an original essay or thesis, and in some instances to pass a clinical examination.

At Cambridge University the M.D. degree may be taken three years after M.B., B.C. two years after M.C. The London and Durham M.D. and M.S. are conferred on M.B. and B.S. graduates respectively, after two years have elapsed; the equivalent degrees of the Victoria University, after one year. At the Scotch Universities the degrees of M.D. or Ch.M. are granted after two years' practice or one year's hospital or research work, if the candidate be 24 years old. Both the Irish Universities require three years to elapse.

Royal Colleges.

The Royal College of Physicians of London grants the membership to university graduates or to its licentiates after an examination, fee £42. Recipients must have attained the age of 25 years. The Royal College of Surgeons of England grants its fellowships to persons of or above 25 years of age, who have been six years in practice, and who must pass the membership examination before the second examination for the higher degree. Fee, if a member, £15, 15s.; if not, £31, 10s. Similarly, the Scottish corporations grant single licences to persons of either sex who already hold a recognised qualification—the Royal College of Physicians, Edinburgh, to those with a surgical; the Royal College of Surgeons, Edinburgh, and the Faculty in Glasgow, to those with a medical qualification. The fee in each case is £15, 15s.

The Royal College of Physicians, Edinburgh, confers its membership on licentiates of the college, and graduates of universities of the United Kingdom, after attaining 24 years, on examination. Fee for licentiate, £15, 15s.; for others, £36, 15s. The fellowship is conferred by election on members, aged 25, of two years' standing. Fee, £64, 18s.

An examination is required of candidates for the Fellowship of the Royal College of Surgeons, who must be 25 years of age, and

registered practitioners of two years' standing. Fee for licentiates, £30; for others, £45. Similar regulations apply to the Fellowship of the Faculty of Physicians and Surgeons of Glasgow, but 24 is the minimum age. The fees are different, if the candidate desires to qualify for holding office or not; £50 or £30 for non-licentiates, £15 or £25 for licentiates.

The Royal College of Physicians of Ireland grants licences in medicine and in midwifery to registered practitioners, a membership diploma to licentiates 25 years of age, of three years' standing, and to practitioners of seven years' standing or University B.A.s., after one year's possession of the licence. Fee, £21 (£15, 15s. to graduates in Arts).

The Royal College of Surgeons in Ireland retains the right of deciding whether candidates for the Fellowship shall be admitted to examination or not. Licentiates or graduates in surgery of less than ten years' standing have to pass two examinations; fees, £26, 5s. for licentiates of the college, £42 for others. When of more than two years' standing they have only one examination; fees, £26, 5s. and £42, as before.

Further information with regard to these qualifications can be obtained from the secretaries of the different colleges. A list containing their names and addresses will be found below (p. xxii.).

Post-Graduate Courses.

In London, Edinburgh, Dublin, Cambridge, regular post-graduate classes are now held, although, when compared with the classes for graduates carried on in connection with many of the continental medical schools, they still leave much to be desired, both in arrangement and in the zeal shown by those who might be expected to support them more warmly. At most of the infirmaries and hospitals throughout the kingdom, in which clinical teaching is recognised, graduates can attend either on the same terms as undergraduates or at special rates.

Fourteen of the London general and special hospitals have lately combined in a scheme for the better provision of post-graduate clinical teaching; a fee of £10, 10s. or of £15, 15s., enabling practitioners to attend the clinical instruction, the operations and autopsies, for three or six months respectively, at any one of these hospitals. The autumn session commenced on 1st September. Further information may be obtained from the Secretary, London Post-Graduate Association, Examination Hall, Victoria Embankment.

In May 1899, a London Medical Graduates College and Polyclinic was opened at 22 Chenies Street, Gower Street, W.C., at which consultations in various branches of medicine and surgery are held daily, except on Saturdays; clinical lectures are given, and practical classes conducted. An annual subscription of £1, 1s. admits the subscriber to the consultations and lectures. The fees for special courses vary from £1, 1s. to £5, 5s. Other institutions of a similar nature in London are the West London Post-Graduates College (Dean, Mr. L. A. Bidwell, West London Hospital, Hammersmith), which is said to be well adapted to the

needs of naval and army surgeons, and the North-East London Post-Graduate College (Dean, Dr. A. J. Whiting, 142 Harley Street, W.), at which the course for the M.D. (Lond.) may be taken. Session begins October 20th.

Both in London and Liverpool Schools of Tropical Medicine have been established, at which graduates can study at first hand the diseases special to tropical countries. The London School commences the first of these annual courses on 1st October.

At Charing Cross Hospital special series of clinical lectures and practical demonstrations, exclusively arranged for the convenience of practitioners and post-graduate students, are given by members of the staff throughout the year. The lectures for the year are arranged in three courses, each consisting of ten meetings, and lasting ten weeks.

In Cambridge, graduates of other universities are admitted as advanced students. They may for one or more terms pursue courses of advanced study or research, literary or scientific, under the direction of the University teachers, and may become members of certain colleges without fulfilling the same conditions as are imposed on junior students, their collegiate status being assimilated to that of students who have taken their first degree in the university.

In Edinburgh a number of classes open to post-graduates are carried on throughout the whole year:—Ophthalmology and Ophthalmoscopy; Laryngology and Diseases of the Throat, Nose, and Ear; Dermatology; Diseases of Children; Chest Diseases; and Gynæcology. Arrangements are from time to time made whereby these various classes may be attended as far as is possible, and according to demand, concurrently. On such occasions special courses in advanced surgical anatomy, medical anatomy, electrical methods, sanitary practice, and other specialities are included.

Any graduate desirous of ascertaining the details of the various classes should apply to the Honorary Secretary, Post-Graduate Courses, Surgeons' Hall, Edinburgh, when a full syllabus will be forwarded, or information supplied.

The Medical Education of Women.

A number of qualifications are now open to men and women alike. The degrees of the English Universities, except Oxford and Cambridge, of the Royal University of Ireland, and of the four Scotch Universities, may be conferred on women; who also may be granted the conjoint diplomas of the Scotch and Irish Boards, and the licence of the Society of Apothecaries, London.

The conditions for the qualification of women are practically the same as those for men. The University of Edinburgh, however, does not recognise attendance on mixed classes without sufficient reason shown.

The secretaries of the different schools, from whom prospectuses and any information required may be obtained, are as follows:—

London School of Medicine for Women—Miss Douie, 8 Hunter Street, Brunswick Square, W.C.

Newcastle School of Medicine (Durham University)—Secretary, Durham University.

Medical College for Women, Minto House, Edinburgh—Miss H. F. Mackay.

Queen Margaret's College, Glasgow—Miss Galloway.

Royal College of Surgeons, Ireland (rooms in connection with the college are set apart for the use of female students)—I. F. Blake, Registrar.

The tables given below show the different degrees and diplomas open to women, the recognised schools, and the approximate cost of the class and college fees.

TABLE V.—*Degrees and Diplomas open to Women.*

University Degrees.	Diplomas.
London. Durham. Birmingham. Sheffield. University College of S. Wales. The Royal, Ireland. The Four Scotch Universities.	1. *Conferring Qualification to Practise.* The Triple Qualification of the Royal Colleges, Scotland. The Conjoint Qualification of the Royal Colleges, Ireland. The Society of Apothecaries, London. 2. *Not conferring Qualification.* Licence of the Royal College of Surgeons, Edinburgh.

With the exception of two of the Scottish Universities, all these qualifications are given on the same conditions as to men. At Edinburgh and Glasgow Universities the compulsory two years' residence is allowed to be represented by residence at a recognised School for the Medical Teaching of Women.

TABLE VI.—*Medical Schools for Women.*

Name.	Cost of Curriculum and Fees.
London School of Medicine for Women, Brunswick Square	£125
College of Medicine, Newcastle-on-Tyne .	£146
Scottish Association, Edinburgh (qualifies for Edinburgh University)	(University), £128, 7s. (Colleges), £130
Queen Margaret College, Glasgow (qualifies for Glasgow University)	£129
Schools of Surgery of the Royal College of Surgeons, Ireland	(For College Degree), £165–£172.
Aberdeen and St. Andrews Universities (only first two years at St. Andrews). Dundee University College. Queen's College, Galway.	

PUBLIC HEALTH.

The Local Government Act, passed in 1888, provides that all medical officers of health of counties or districts with a population of 50,000 or more, must possess a diploma in public health, or must have been a medical officer of a district with 20,000 inhabitants for three consecutive years before 1892; or, before the

passing of the aforesaid Act, have been for not less than three years a medical officer or inspector under the Local Government Board.

Qualifications in public health (sanitary science, sanitary medicine, State medicine) are therefore much more sought after than formerly. They do not carry a right to register, and are only conferred on candidates already possessed of a registrable qualification.

Certain regulations for candidates for diplomas in public health, designed to ensure "the possession of a distinctly high proficiency, scientific and practical, in all the branches of study which concern the public health," have been laid down by the General Medical Council. The Council now recommends the following rules to be observed:—

Every candidate shall produce evidence of having, after obtaining a registrable qualification, attended, during six months, practical instruction in a laboratory.

1. A period of not less than twelve months shall elapse between the attainment of a registrable qualification in medicine, surgery, and midwifery, and the admission of the candidate to any examination or any part thereof for a diploma in sanitary science, public health, or State medicine.

2. Every candidate shall produce evidence of having, after obtaining a registrable qualification, attended during six months, practical instruction in a laboratory or laboratories, British or foreign, approved of by the body granting the diploma, in which chemistry, bacteriology, and the pathology of the diseases of animals transmissible to man are taught.

3. Every candidate shall produce evidence that, during a period of six months after obtaining a registrable qualification, he has practically studied the duties of outdoor sanitary work—(*a*) In England and Wales, either under the medical officer of health of a county, or of a single sanitary district having, at the date of the last census, a population of not less than 50,000, or a medical officer of health, devoting his whole time to public health work; or (*b*) in Scotland or Ireland, under the medical officer of health of a county, or of one or more sanitary districts having at the date of the last census a population of not less than 30,000; or (*c*) under a medical officer of health who is also a teacher in the department of public health of a recognised medical school. The six months may be reduced to three, if a three months recognised course of Sanitary Law and Engineering Vital Statistics, etc., has been attended.

*** Any candidate who shall produce evidence that he has himself held an appointment of medical officer of health, under conditions not requiring the possession of a special sanitary diploma, shall be exempt from this regulation.

4. Every candidate shall produce evidence that he has attended the clinical practice for three months of a hospital for infectious

diseases, at which opportunities are afforded for the study of methods of administration.

5. The examination shall be conducted by Examiners specially qualified, and shall include laboratory work.

*** The rules as to study shall not apply to medical practitioners registered, or entitled to be registered, on or before 1st January 1890.

Degrees and Diplomas.

DEGREES (FOR UNIVERSITY GRADUATES IN MEDICINE).

M.D. (State Medicine), London. (Two years' study required.)

B.Hy., Durham. (Three months' course in comparative pathology (lectures), etc.; must study at Newcastle School of Medicine.)

B.Sc., Birmingham. (Six months' laboratory course of hygienic chemistry; a course of bacteriology; six months' practical outdoor experience; attendance upon a fever hospital.)

B.Sc., Edinburgh. (Eight months' laboratory (five at Edinburgh University) courses in physics, geology, public health, sanitary engineering, and in mensuration and drawing required, as well as official regulations.)

D.Hy., Durham. (Earliest date, two years after B.Hy., spent as M.O.H. Essay sent in.)

D.Sc., Edinburgh. (Five years after B.Sc., Thesis and Examination.)

B.Sc., Victoria University, Manchester (three years' study required).

DIPLOMAS.

D.P.H.
- Durham University. (Regulations as for B.Hy., but need not be a University graduate, nor have studied at Newcastle.)
- Oxford University. (Must fulfil General Medical Council's conditions.)
- Cambridge University. (Do.)
- Victoria University. (As at Oxford.)
- Aberdeen University. (Fever hospital course, six months; if not M.B.Aberd., must attend some of the necessary classes.)
- Birmingham University. (As at Oxford.)
- Leeds University. (As at Oxford.)
- Royal Colleges, London. (As at Cambridge.)
- Royal Colleges, Edinburgh and Glasgow. (As at Oxford.)

D.S.M., Dublin University. (Must be a graduate of the Universities of Dublin, Oxford, or Cambridge, or M.D.)

,, Royal Colleges, Ireland. (As at Oxford.)

D.S.Sc., Royal University, Ireland. (Only conferred on graduates of the University. Cf. Calendar.)

Medical practitioners who registered or were entitled to register before 1st January 1890 are admitted to the examination for the Durham D.P.H., under the same conditions as are noted above. Twenty-eight days' notice is required. Fee, £10, 10s. At Oxford and Cambridge Universities the diplomas in public health are granted to any registered person who, if he qualified before 1st January 1890, is not required to pursue a prescribed course of study. Similar regulations govern the examinations of the different colleges in the case of those who qualified prior to 1890.

The actual scope of the examinations as held at the different centres can be easily ascertained from the syllabuses and calendars to be obtained from the secretaries. The titles of the books best adapted for perusal in view of the examinations may be seen in the *British Medical Journal* for September 3, 1904.

Fees for examinations.—D.P.H.—£10, 10s., English, Scottish, and Irish Colleges; Durham, St. Andrews, and Victoria Universities: £5, London and Royal Irish Universities: £5, 5s., Aberdeen: £10, Oxford: £12, 12s., Cambridge.

B.Sc.—£6, 6s., Edinburgh; £10, Birmingham.

B.Hy.—£16, 16s., Durham.

Usual fee for six months' laboratory work, £10, 10s. to £21.

Institutions at which Laboratory Work and Classes for Public Health Curriculum can be taken.

LONDON.

St. Bartholomew's Hospital.—Inclusive fee, 20 guineas.

Charing Cross Hospital.—Inclusive fee, 20 guineas.

St. George's Hospital.—Inclusive fee, 20 guineas; for candidates registered before 1st January 1890, 12 guineas.

Guy's Hospital.—Inclusive fee for six months' course of laboratory instruction and lectures, 20 guineas.

King's College.—Fee includes all course necessary.

London Hospital.—Inclusive fee, 20 guineas; three months' course, 12 guineas.

St. Mary's Hospital.—Six months' course, inclusive fee, 12 guineas.

St. Thomas's Hospital.—Inclusive fee, 20 guineas; short course, 6 guineas.

University College.

Middlesex Hospital.

PROVINCIAL.

Cambridge University.

Birmingham University.—Inclusive fee, 13 guineas.

University of Liverpool.

University of Leeds.

University of Durham, College of Medicine, Newcastle-on-Tyne.

University College, Bristol.

Victoria University, Manchester.

IRELAND.

School of Physic, Dublin.

The Catholic University School of Medicine.

Royal College of Surgeons, Schools of Surgery, Dublin.

SCOTLAND.

University of Edinburgh.—Fees, winter session, 10 guineas; summer session, 6 guineas.

University of Glasgow.—Fee for course of instruction, 10 guineas.

University of Aberdeen.—Fee for course of instruction, 9 guineas.

St. Mungo's College, Glasgow.—Fees: winter session of lectures and six months' laboratory instruction, 12 guineas; summer session of lectures and three months' laboratory instruction, 6 guineas.

The Conjoint Board in Scotland.—Fee for six months' laboratory course, 18 guineas.

Clinical Hospitals.

There are a number of hospitals throughout the kingdom which may be attended for the purpose of clinical study, especially during the fifth year of the curriculum, and attendance at which is accepted by many of the licensing boards as part of the compulsory period for hospital work.

In *London*, in addition to the clinical hospitals attached to the medical schools, the conjoint board of the Royal Colleges of Physicians and Surgeons accept certificates of attendance during the fifth year of study, from the—Great Northern Central Hospital, 155 beds; West London Hospital, 175 beds, Fee, 5 guineas; The Hospital for Sick Children, Great Ormond Street, 186 beds, Fee, 3 guineas; East London Hospital for Children, 100 beds, Fee, 4 guineas; Royal London Ophthalmic Hospital, 100 beds, Fee, 5 guineas; Hospital for Consumption, Brompton, 321 beds, Fee, 8 guineas; City of London Hospital for Diseases of the Chest, 164 beds; National Hospital for the Paralysed, etc., Queen Square, 200 beds; Queen Charlotte's Lying-in Hospital, 1100 patients annually, Fee, 8 guineas for four weeks.

Fever hospitals and asylums.—The Metropolitan Fever Hospitals, Fee, £3, 3s., two months, £1, 1s. each additional month; Bethlem Royal Hospital, Lower Hall Asylum, Bow; Camberwell House Asylum, Bethnal.

THE PROVINCES.

Liverpool—Royal Southern, 200 beds, Fee, £26, 5s.[1]; Northern, 155 beds, Fee, £26, 5s.[1]; Eye and Ear Infirmary, Myrtle Street, 46 beds; Infirmary for Children, 88 beds, free.

Manchester—St. Mary's Hospital for Diseases of Women and Children, 55 beds, 3400 labours, Fee for necessary course, £2, 2s.

Newcastle-on Tyne—Hospital for Sick Children, 60 beds, free.

Bath—Royal United Hospital, 130 beds.

Birmingham—Midland Hospital for Skin and Urinary Diseases, £5, 5s. for three months.

Bradford—Royal Infirmary, 230 beds, £10, 10s.[1]

Brighton—Sussex County Hospital, 190 beds, £21 for two years.

Derby—Derbyshire Royal Infirmary, 198 beds, £10, 10s. annually.

Devonport—Royal Albert Hospital, 88 beds, £2, 2s.

Hospitals in *Exeter*, *Gloucester*, £20 a year; *Lincoln*, £10, 10s.; *Norwich*, £15, 15s.; *Nottingham*, £10, 10s.; *Staffordshire*, £10, 10s.; *Winchester*, £21[1]; *Wolverhampton*, £21.[1]

SCOTLAND.

Edinburgh—Royal Infirmary, 790 beds, £12[1]; Victoria Hospital for Consumption, 15 beds, £2, 2s. for course; Royal Hospital for Sick Children, 119 beds, £2, 2s. for course; Eye, Ear, and Throat Infirmary, 6 beds, £1, 1s.; Royal Maternity, 40 beds, £2, 2s.; City Hospital for Infectious Diseases, 400 beds, £2, 2s.; Royal Asylum, Morningside, 700 beds, £2, 2s.

Glasgow—Royal Hospital for Sick Children, 80 beds, £1, 1s.; Western Infirmary; 400 beds, £21[1]; Eye Infirmary, £1, 1s.; Royal Infirmary, £21[1]; Maternity; Belvedere Fever Hospital; Lock Hospital.

Dundee—Royal Infirmary, 286 beds; Royal Asylum.

Aberdeen—Royal Infirmary, Fee, £6; Sick Children's Hospital.

IRELAND.

Dublin—Sir Patrick Dun's Hospital, £12, 12s.[1]; Richmond, Whitworth, and Hardwicke Hospitals,[2] 312 beds; Richmond Asylum, 1200 beds; Adelaide Hospitals, 140 beds; City of Dublin Hospital; Jervis Street Hospital, £12, 12s. a year; Mater Misericordiæ Hospital,[2] 323 beds; Dr. Steeven's Hospital,[2] 200 beds, £10, 10s., three months; St. Vincent's Hospital, 160 beds; Meath Hospital,[2] 160 beds; Rotunda Hospital, 1700 labours intern, 1800 extern annually—Fee, for term, six months, £21, three months, £12, 12s., Extras, £10, 10s. and £6, 6s., Cork Street Fever Hospital; Coombe Lying-in Hospital.

Belfast—The Royal, £20[1]; Maternity; Ophthalmic; Eye, Ear, and Throat Hospitals; and those for Diseases of Women, for Sick Children, and the District Asylum.

Cork—North (100 beds) and South (100 beds) Infirmaries; the Mercy, Cork Union, Lying in, Maternity, Fever, Gynecological, and Ophthalmic and Aural Hospitals; and the Eglinton Asylum.

Galway—County Infirmary and Lower Hospital.

Dental Surgery.

Licences to practise dentistry and to be registered are obtainable from the Royal College of Surgeons of England, of Edinburgh, and of Ireland, and from the Faculty of Physicians and Surgeons of Glasgow.

A large number of the medical teaching institutions provide special arrangements for dental students. A list of the majority of these is given on page xxii.

[1] Perpetual. [2] Contain beds for Fever patients.

Regulations of the General Medical Council.

Candidates for a diploma in dental surgery shall produce certificates of having been engaged during four years in professional studies, and of having received three years' instruction in mechanical dentistry from a registered practitioner. One year's *bonâ fide* apprenticeship with a registered dental practitioner, after being registered as a dental student, may be counted one of the four years of professional study. The three years of instruction in mechanical dentistry, or any part of them, may be taken by the dental student, either before or after his registration as a student; but no year of such mechanical instruction shall be counted as one of the four years of professional study unless taken after registration.

A register of dental students is kept by the Registrar of the General Medical Council, 299 Oxford Street, London.

Preliminary education.—Dental students are subject to the same regulations as regards preliminary education as medical students, but professional study may commence by pupilage with a registered dental practitioner.

The Royal College of Surgeons of England.

Licence in Dental Surgery.

The following are the regulations:—

I. There is a Preliminary Science Examination and two Professional Examinations for the licence. The Preliminary Science Examination consists of chemistry, physics, and practical chemistry, and is identical with Part I. of the First Examination of the Examining Board in England for medicine. The First Professional Examination for the licence consists of mechanical dentistry and dental metallurgy; and the Second, general anatomy and physiology, general surgery and pathology, dental anatomy and physiology, dental pathology and surgery, and practical dental surgery.

Candidates will be required to show a general knowledge of the anatomy of the whole human body.

II. Candidates will be required to produce certificates of having received instruction, at an institution recognised for the purpose, in chemistry, physics, and practical chemistry, before entering for the Preliminary Science Examination.

*** This instruction may be taken prior to the date of registration as a dental student.

III. Candidates will be required to produce the following certificates before entering for the First Professional Examination, namely:—

1. Of having been engaged, during a period of not less than three years, in acquiring a practical familiarity with the details of mechanical dentistry, under the instruction of a competent practitioner, or under the direction of the superintendent of the mechanical department of a recognised dental hospital, where the arrangements for teaching mechanical dentistry are satisfactory to the Board of Examiners in Dental Surgery. In the case of qualified surgeons, evidence of a period of not less than two instead of three years of such instruction will be sufficient.

*** This instruction may be taken prior to the date of registration as a dental student.

2. Of registration as a dental student by the General Medical Council.

3. Of having attended at a recognised dental hospital and school:

(*a*) A course of lectures on dental metallurgy.

(*b*) A course of practical dental metallurgy.

(*c*) A course of lectures on dental mechanics.

(*d*) A course of practical dental mechanics, including the manufacture and adjustment of six dentures and six crowns.

IV. Candidates will be required to produce the following certificates before entering for the Second Professional Examination, namely:—

1. Of having been engaged during four years in the acquirement of professional knowledge, subsequently to the date of registration as a dental student.

2. Of having attended at a recognised dental hospital and school:

(*a*) A course of dental anatomy and physiology.

(*b*) A separate course of dental histology, including the preparation of microscopical sections.

(*c*) A course of dental surgery.

(*d*) A separate course of practical dental surgery.

(*e*) A course of not less than five lectures on the surgery of the mouth.*

(*f*) A course of dental bacteriology.

(*g*) A course of dental materia medica.

* These lectures may be given either at a recognised dental hospital and school, in which case the lecturer must be a qualified surgeon practising surgery, or they may be given at a recognised medical school, and may form part of the course required by Clause 8 (*d*).

3. Of having attended at a recognised dental hospital or in the dental department of a recognised general hospital, the practice of dental surgery during two years.

4. Of having attended at a recognised medical school:

(*a*) A course of lectures on anatomy.

(*b*) A course of lectures on physiology.

(*c*) A separate practical course of physiology.

(*d*) A course of lectures on surgery.

(*e*) A course of lectures on medicine.

5. Of having performed dissections at a recognised medical school during not less than twelve months.

6. Of having attended at a recognised hospital or hospitals, the practice of surgery and clinical lectures on surgery during two winter sessions.

7. Of being 21 years of age.

*** The certificates of professional study will be required to show that students have attended the courses of professional study to the satisfaction of their teachers.

V. Candidates may present themselves for the Preliminary Science Examination before entering at a dental school, on production of the certificates required under Section II. This examination will be identical with Part I. of the First Examination of the Examining Board in England.

VI. Candidates may present themselves for the First Professional Examination for the licence after the completion of six months' attend-

ance at a recognised dental hospital and school, on production of the certificates required under Section III.

VII. Candidates may present themselves for the Second Professional Examination, on production of the certificates required under Section IV., after the completion of four years' professional study from the date of registration as a dental student, and after the lapse of not less than six months from the date of passing the First Professional Examination.

VIII. Synopses of the examination in chemistry, physics, and practical chemistry, and dental metallurgy, are issued with the regulations.

IX. The Preliminary Science Examination will be held in January, March or April, July and October in each year.

The First and Second Professional Examinations will be held in May and November in each year. Candidates are required to give twenty-one clear days' notice of their intention to present themselves for examination.

Special Exemptions.

A candidate who shall produce satisfactory evidence of having passed an examination for a degree in medicine, conducted at a university in the United Kingdom, in India, or in a British colony, on the subjects of the Preliminary Science Examination, will be exempt from that examination.

Candidates who have passed the Second Examination of the Examining Board in England, or who shall produce evidence of having passed the examination in anatomy and physiology required for the licence in surgery of the Royal College of Surgeons of Edinburgh, the Royal College of Surgeons in Ireland, or the Faculty of Physicians and Surgeons of Glasgow, or an examination in anatomy and physiology required for a degree in medicine or surgery at a university in the United Kingdom, will be exempt from re-examination in those subjects.

Candidates who are members of the college, or who have passed the examination in surgery of the Examining Board in England, or who shall produce evidence of having passed the examination in surgery for the licence in surgery of the Royal College of Surgeons of Edinburgh, the Royal College of Surgeons in Ireland, or the Faculty of Physicians and Surgeons of Glasgow, or an examination in surgery for a degree in medicine or surgery at a university in the United Kingdom, will be exempt from re-examination in general surgery and pathology.

Fees to be paid by candidates, £21.

The Royal College of Surgeons of Edinburgh.

Licence in Dental Surgery.

The candidate must fulfil the conditions of the regulations of the General Medical Council (see above); and the regulations as to curriculum are generally the same as those of the Royal College of Surgeons of England.

Special Exceptions.

Candidates who have passed the corresponding examinations for the Triple Qualification will be exempt from the First Dental Examina-

tion, and will have the advantage of being admissible either to the Final Dental Examination or to the Final Examination for the Triple Qualification, or to both. But the First Dental Examination will not be held as equivalent to the Triple Examinations, and will admit to the Final Dental Examination only. Candidates who are licentiates of this college, or who may be registered medical practitioners, will require to produce certificates of attendance on the special subjects only, and will be examined in these only for the dental diploma. Any candidates who shall produce satisfactory evidence of having passed in any of the subjects of the First Dental Examination, before any dental or surgical licensing board recognised by the Royal College of Surgeons of Edinburgh, will be exempt from examination in such subject or subjects; but no examination will be recognised as giving exemption, unless it is coextensive in its scope with the examinations of this college, and is the only final examination on the subject or subjects required by the board at which it was passed.

Fees.—The fee for the diploma is £10, 10s. to those who began their studies before 1st October 1896; £15, 15s. to those who began after that date.

Faculty of Physicians and Surgeons of Glasgow.

The regulations as to certificates, curriculum, number of examinations, fees, and examinations are in effect similar to those of the Royal College of Surgeons of Edinburgh. There is special provision for candidates who intend to qualify both under the Medical and Dentists Act, and there is an examination in practical dentistry conducted in a dental hospital, and also a practical examination in mechanical dentistry.

The Royal College of Surgeons in Ireland.

Licence in Dentistry.

Candidates are required to pass three examinations, namely, Preliminary (in general education), Primary Dental, and Final Dental.

DENTAL TEACHING INSTITUTIONS.

London.

Dental Hospital of London and School of Dental Surgery, Leicester Square. Fee for dental course of two years, £50. Fee for general and hospital practice for two years, £55.

National Dental Hospital or College, Great Portland Street, W. Fee for necessary course, £42.

Guy's Hospital and London Hospital.

Provinces.

University of Birmingham. Composition fee, £73, 2s.
University of Liverpool. Composition fee, £73, 2s.
University College, Bristol.
Durham University and Newcastle School of Medicine.
University College, Bristol.
University of Manchester.
Devon and Exeter Dental Hospital, Exeter.

Scotland.

Incorporated Edinburgh Dental Hospital and School. Minimum fee, £78, 13s.

Dental Hospital and School, Glasgow.

Dental Department, Royal Glasgow Infirmary.

Anderson's College, Glasgow.

Ireland.

School of the Royal College of Surgeons, Ireland.

Special composition fees are charged at several of the London hospitals for the classes required by dental students apart from those taken at a dental hospital. Thus, Charing Cross and Middlesex Hospitals, £56, 14s.; Westminster Hospital, £50; St. Thomas's, £65; St. George's, £50; King's College, hospital fee, two years, £25, 4s.; lectures, £15, 15s.

Names and Addresses of the Secretaries and Registrars of certain of the Medical Schools.

I. *Branch Registrars of the General Medical Council.*

England—Mr. H. E. Allen, B.A., LL.B., 299 Oxford Street, London, W.

Scotland—Mr. James Robertson, 54 George Square, Edinburgh.

Ireland—Mr. Richard J. E. Roe, 35 Dawson Street, Dublin.

II. *Secretaries and Registrars, etc., of Medical Bodies.*

The Secretary—English Conjoint Board, Victoria Embankment, London, W.C.

The Secretary—Royal College of Surgeons, Lincoln's Inn Fields, London, W.C.

The Secretary—Apothecaries' Hall, Blackfriars, London, E.C.

The Secretary—University of Durham, College of Medicine, Newcastle-on-Tyne.

The Secretary—Royal College of Physicians, Edinburgh.

The Secretary—School of Medicine of the Royal Colleges, Edinburgh, 24 Forrest Road, Edinburgh.

The Secretary—Royal College of Surgeons, Edinburgh.

The Secretary—Anderson's College Medical School, Glasgow.

The Secretary—Educational Institute of Scotland, 40 Princes Street, Edinburgh.

The Secretary—Royal University of Ireland, Dublin.

The Registrar—Royal College of Physicians, Pall Mall East, London, S.W.

The Registrar—University of London, Burlington Gardens, London, W.

The Secretary—University of Birmingham.

The Dean of the Faculty of Medicine—In each of the Scotch Universities.

The Dean of the Faculty of Medicine—Victoria University, Owens College, Manchester.

The Secretary—Irish Conjoint Board, 6 Kildare Street, Dublin.

III. *Inspectors of Conjoint Examination in Scotland.*

Mr. James Robertson, 54 George Square, Edinburgh.
Mr. Alexander Duncan, B.A., 242 St. Vincent Street, Glasgow.

Army Medical Department.

WAR OFFICE, LONDON.

Schedule of Qualifications necessary for Candidates desirous of obtaining Commissions in the Royal Army Medical Corps, with the Conditions of Service.

Qualifications.

1. A candidate for a commission in the R.A.M.C. must be 21 years and not over 28 years of age at the date of commencement of the entrance examination. He will be required to complete the following forms:—

1. Name in full.
2. Address.
3. Date of birth.
4. Registrable qualifications.
5. Academic or other distinction.
6. Name of Dean or other responsible authority of the school in which the candidate completed his course as a medical student.
7. Particulars of any commission or appointment held in the public services.
8. Date of examination at which the candidate proposes to present himself.

[*N.B.*—Misstatements invalidate subsequent appointments, etc.]

The Dean of the candidate's medical school will be requested to furnish a confidential report anent the candidate—his character, conduct, ability, and fitness. If approved by the Director-General, he will then be allowed to compete; first being examined by a board of medical officers.

The medical examination includes height, weight, chest measurement, eyesight, hearing, speech, condition of teeth, of heart and lungs, rupture, varicocele, varicose veins, development of limbs, of feet and toes, of skin, congenital malformations, and constitution. If there is any doubt, the Board have to state whether candidate, in their opinion, is of pure European descent.

The Secretary of State reserves the right of rejecting any candidate who may show a deficiency in his general education, as evinced by bad spelling or composition.

An entrance fee of £1 is required from each candidate admitted to the competition, and is payable at the conclusion of his physical examination, if pronounced fit.

A candidate successful at the entrance examination will be appointed a lieutenant on probation, and will be required to pass through such courses of instruction as the Secretary of State shall decide, and, after passing the examinations in the subjects taught, and satisfying the Director-General that he possesses the necessary

skill, knowledge, and character for permanent appointment to the Royal Army Medical Corps, his commission as lieutenant will be confirmed. The commission shall bear the date of the officer's appointment as lieutenant on probation.

Before the commission as a lieutenant on probation is confirmed, he must be registered under the Medical Acts in force in the United Kingdom at the time of his appointment.

The precedence of lieutenants among each other shall be in order of merit, as determined by the combined results of the entrance examination and the examinations undergone while on probation.

Lieutenants, when appointed on probation, will receive instructions as to the provision of uniform.

Examinations.

Subjects for the Entrance Examination.

Candidates will be examined by the Examining Board in medicine and surgery. The examination will be of a clinical and practical character, partly written and partly oral, marks being allotted under the following scheme:—

Medicine (written).

	Maximum Marks.
A. Examination and report upon a medical case in the wards of a hospital	125
B. Commentary upon a case in medicine	125
(Three hours allowed for A and B together.)	

Medicine (oral).

A. Clinical cases; clinical pathology	75
B. Morbid anatomy and morbid histology	75
(One quarter of an hour allowed for each table.	

Surgery (written).

A. Examination and report upon a surgical case in the wards of a hospital	125
B. Commentary upon a case in surgery	125
(Three hours allowed for A and B together.)	

Surgery (oral).

A. Clinical cases, including diseases of the eye; surgical instruments and appliances	75
(One quarter of an hour allowed for this table.)	
B. Operative surgery and surgical anatomy	75
Total marks	800

The following headings are published as a guide to candidates in drawing up their reports on cases:—

(*a*) A brief history of the case as given by the patient, including such points only (if any) in the family or personal history as have a distinct bearing upon the present illness or incapacity. (*b*) A detailed account of the subjective symptoms and physical signs elicited by the candidate's personal examination of the patient, noting the absence of any which might be expected to be present in a similar case. (*c*) Where there is any reasonable doubt in the mind of the candidate as to an exact

diagnosis, he is to give the alternatives, with his reasons for making the selection. (*d*) A commentary upon the case as a whole, pointing out the symptoms which may be considered typical, and those which appear to be unusual or only accidental complications. (*e*) Suggestions as to treatment, both immediate and possibly necessary at a later date. (*f*) A forecast of the progress and probable termination of the case.

Similarly, the commentary on the report of a case submitted to the candidate should discuss:—

(*a*) The family and personal history and other conditions preceding the development of the condition described. (*b*) The relative significance of the physical signs, symptoms, other indications of disease noted, and the general clinical aspects of the case. (*c*) The diagnosis, with reasons for selection of the most probable, when a positive diagnosis cannot be attained. (*d*) The treatment, dietetic, medicinal, operative, etc., including a criticism of the plan adopted, and alternative schemes of treatment in case of disagreement. (*e*) The morbid appearances and an account of the post-mortem examination (if any).

The examination will be held in London, and will occupy about four days.

The appointments announced for the competition will be filled up from the list of qualified candidates, arranged in the order of merit, as determined by the total number of marks each has obtained. Having gained a place in this entrance examination, the successful candidates will undergo two months' instruction in hygiene and bacteriology, after which they will be examined in these subjects. The maximum number of marks obtainable at this examination will be 100. It has been determined that this course shall be delivered in London, and not as heretofore at Netley.

On completion of the above course, lieutenants on probation will be ordered to proceed to the depôt of the Royal Army Medical Corps at Aldershot for a three months' course of instruction in the technical duties of the corps, and at the end of the course will be examined in the subjects taught. The maximum number of marks obtainable at this examination will be 100. A lieutenant on probation who fails to qualify in either of these examinations will be allowed a second trial, and, should he qualify, will be placed at the bottom of the list. Should he again fail in either examination, his commission will not be confirmed.

Extracts from the Royal Warrant for Pay and Promotion, 1894, *as amended by Royal Warrant of* 18*th September* 1894, *and from the Regulations for Army Medical Services,* 1902.

PAY.

The pay of the officers of the R.A.M.C. shall be at the following rates:—

AT HEADQUARTERS.	Inclusive of all Allowances except Field and Travelling Allowances (Yearly).
Director-general	£2000 0 0
Deputy director-general	1500 0 0
Assistant director-general	850 0 0
Deputy assistant director-general	750 0 0

At Other Stations.	Excl. of Allowances (Daily).
Surgeon-general	£3 0 0
Colonel	2 0 0
Lieutenant-colonel	1 10 0
Lieutenant-colonel specially selected for increased pay after at least 8 years' service abroad	1 15 0
Major	1 3 6
After 3 years as such	1 6 0
Captain	0 15 6
After 7 years' total full-pay service	0 17 0
,, 10 years' total full-pay service	1 1 0
Lieutenant on probation and lieutenant	0 14 0
Adjutant of the Royal Army Medical Corps (Volunteers)	The Pay of his Rank.

Retired Pay.

An officer of our Medical Staff, after completing ten years' service on full pay, may be permitted to retire from our army with retired pay or gratuity, according to the scale laid down in Art. 1071, if such voluntary retirement be specially recommended by our Commander-in-Chief, and approved by our Secretary of State.

The appointment of Director-General of the Army Medical Department shall be for seven years, and the retirement of the other officers of our Army Medical Staff shall be compulsory at the following ages, except that, if it should in any particular case be considered desirable in the interests of the public service, the age for the retirement of a surgeon-general may be extended for a period not exceeding two years—surgeon-general, 60 years; surgeon-colonel, 57 years; and other officers, 55 years.

Scale of Retired Pay.

	Yearly.
Director-general after three years' service in the appointment (with 30 years' service)	£1125 0 0
Under 3 years' service as Director-general and after not less than 30 years' service	875 0 0
	Daily.
Surgeon-general	£2 0 0
Colonel, R.A.M.C., and Household Troops	1 15 0
Lieutenant-colonel, R.A.M.C., and surgeon-lieutenant-colonel, Household Troops:—	
After 20 years' service	1 0 0
,, 25 ,,	1 2 0
,, 30 ,,	1 5 0
Lieutenant-colonel, after having been in receipt of the increased pay (5s. a day additional) for 3 years, or a brigade surgeon-lieutenant-colonel of the Household Troops:—	
Under 30 years' service	1 7 6
After 30 ,,	1 10 0
Major, or surgeon-major of the Household Troops:—	
After 20 years' service	1 0 0
,, 25 years' service, if his service reckoning for promotion is insufficient to qualify him for promotion to the rank of lieutenant-colonel under Article 351	1 2 6

	Gratuity.
Major or captain :—	
After 5 years' service in the rank of captain . . .	£1000 0 0
,, 8 ,, ,, major . . .	1800 0 0
,, 6 ,, ,, ,, . . .	2500 0 0
Surgeon-lieutenant-colonel or surgeon-major of the Household Troops :—	
After 15 years' service	1800 0 0
,, 18 ,, ...	2500 0 0

Except in the case of a lieutenant-colonel, an officer of the Army Medical Service, who, on voluntary retirement, has served for less than three years in the rank from which he retires, shall be entitled only to the gratuity or retired pay assigned to the next lower rank.

Promotion.

Every promotion of a medical or departmental officer shall be given upon the recommendation of the Commander-in-Chief, with the approval of the Secretary of State. Promotion by selection shall be given on the ground of ability and merit, due consideration being given, however, to length of efficient service.

An officer shall be eligible for promotion to the rank of captain on the completion of three and a half years' service, and to the rank of major on the completion of twelve years' service, provided that, in each case, he has previously qualified in such manner as may be prescribed by the Secretary of State.

Promotion to the rank of lieutenant-colonel shall be made by selection from officers who have completed at least twenty years' service, and have qualified in such manner as may be prescribed by the Secretary of State.

If an officer has passed with distinction the examination qualifying for promotion to the rank of major, the period of service required to render him eligible for the rank of major or lieutenant-colonel may be reduced as follows:—

	Months.
If he obtained a "special certificate"	18
,, passed in the 1st Class	12
,, ,, ,, 2nd ,, ...	6
,, ,, ,, 3rd ,, ...	3

Promotion to the rank of colonel shall be made by selection from lieutenant-colonels who have been specially selected for increased pay and from lieutenant-colonels or surgeon-lieutenant-colonels of the Household Troops specially recommended to the Secretary of State for distinguished service in the field. Promotion to the rank of surgeon-general shall be made by selection from colonels. A colonel may also be promoted to the rank of surgeon-general, for distinguished service in the field. In cases of distinguished service in the field a departmental officer may, with the concurrence of the Lords Commissioners of the Treasury, be promoted from any rank or class to the next above it, and shall, if promoted to a rank or class having a fixed establishment, remain supernumerary in such rank or class until the occurrence of the vacancy to which in the ordinary course he would have been pro-

moted. An officer of the Royal Army Medical Corps is eligible for promotion to brevet rank. A captain after at least six years' service, a major or lieutenant-colonel, may be promoted to the next higher rank by brevet, for distinguished service in the field or for distinguished service of an exceptional nature other than in the field. If the officer dies before the date on which the notification of his promotion for distinguished service in the field appears in the *London Gazette*, the promotion shall bear the date which it would have borne had the officer not died. Distinction in original investigation or research may, in the case of officers of the Royal Army Medical Corps, be regarded as "distinguished service of an exceptional nature other than in the field." An officer who does not qualify for promotion to the rank of captain or major within the periods specified, shall be placed on the supernumerary list until he qualifies or is retired from the service. Service on the supernumerary list shall not reckon towards promotion, increase of pay, gratuity, or pension.

Examinations for Promotion in the Royal Army Medical Corps.

Lieutenant before promotion to captain.—(For lieutenants appointed after March 31, 1901.) This examination may be taken at any time after completing 18 months' service, and will be held in the military district in which the officer is serving. The subjects of this examination, which are detailed in the King's Regulations, are as follows:—

(1) Regimental duties; (2) drill; (3) military law; (4) duties and accounts connected with military hospitals and their supplies; and (5) other duties of executive medical officers.

Captain before promotion to major.—(For captains promoted to that rank after July 27, 1895.) Captains will be examined under the rules laid down in Paragraph 24, and will be eligible for acceleration in their promotion to the rank of major, under Article 352 of the Royal Warrant.

This examination, which may be taken at any time after completing five years' service, will be held in London on the termination of a period of special study. The examination will consist of written papers, essays, oral and practical examinations in the following subjects, which are detailed in the King's Regulations:—

(1) Medicine; (2) surgery; (3) hygiene; (4) bacteriology and tropical disease; and (5) one special subject, from the subjoined list, to which additions may from time to time be made—(*a*) bacteriology, including the preparation of antitoxine; (*b*) dental surgery; (*c*) dermatology; (*d*) laryngology; (*e*) midwifery and gynæcology; (*f*) operative surgery, advanced; (*g*) ophthalmology; (*h*) otology; (*i*) pediatrics; (*k*) psychological medicine; (*l*) skiagraphy; and (*m*) specific fevers.

Captains serving in that rank before July 27, 1895, will be promoted under the old regulations contained in Appendix I.,

Regulations for Army Medical Services, and will not be eligible for acceleration.

Majors before promotion to lieutenant-colonel (for majors promoted to the rank after March 31, 1895).—This examination, which may be taken at any time after three years in the rank of major, will be held in the military district in which the officer is serving, at times which will be duly notified. The subjects of this examination, which are detailed in the King's Regulations, are as follows:—

(1) Military law; (2) army medical organisation; (3) sanitation of towns, camps, transports, etc.; (4) epidemiology and the management of epidemics; (5) one special subject from the subjoined list to which additions may from time to time be made—(*a*) medical history of important campaigns; (*b*) a general knowledge of the Army Medical Services of other Powers; and (*c*) the laws and customs of war in relation to the sick and wounded.

The questions and answers will be forwarded, under a sealed confidential cover, to the Director-General of the Army Medical Department, for transmission to the examiners, who will report to the Director-General as to the competence of the officer examined.

Indian Medical Service.

The regulations for the examination of candidates for admission to His Majesty's Indian Medical Service differ only slightly from those of the home service. The declarations are sent to the Military Secretary, India Office, Westminster.

The physical fitness of each candidate will be determined previous to examination by a board of medical officers, who are required to certify that his vision is sufficiently good to enable him to perform any surgical operation without the aid of glasses. Further particulars as to the standard of eyesight will be found in a pamphlet by Sir J. Fayrer, M.D., K.C.S.I., entitled "Regulations as to Defects of Vision," published by Messrs. J. & A. Churchill, 7 Great Marlborough Street, W. A moderate degree of myopia will not be considered a disqualification, provided it does not necessitate the use of glasses during the performance of operations, and that no organic disease of the eyes exists. Every candidate must also be free from all other organic disease, and from constitutional weakness, or other disability likely to unfit him for military service in India. Candidates who pass the Medical Board Examination will be required to pay a fee of £1 before being permitted to compete.

On producing the foregoing qualifications, the candidate will be examined by the Examining Board in the following subjects, and the highest number of marks attainable will be distributed as follows:—

	Marks.
1. Medicine, including therapeutics	1200
2. Surgery, including diseases of the eye	1200
3. Surgical anatomy and physiology	600
4. Pathology and bacteriology	600
5. Midwifery and diseases of women and children	600
6. Chemistry and pharmacy, with either botany or zoology	600

Course at Netley.—These courses will be of not less than four months' duration; but candidates who have already gone through a course at Netley, as candidates for the Army Medical Service, may, if thought desirable, be exempted from attending the School a second time.

At the conclusion of the course at Netley, and after the leaving examination, the position of the candidates on the list of surgeon-lieutenants will be determined by the combined results of the Preliminary and Final Examinations, and, so far as the requirements of the service will permit, they will have the choice of commands in India (*i.e.* Bengal, Punjab, Madras, or Bombay) according to their position in that list.

Officers appointed to the Indian Medical Service will be placed on one list. Though ordinarily employed within the limits of the command to which they may have been posted, they will be liable to employment in any part of India, according to the exigencies of the service.

No candidate will be permitted to compete more than three times.

Examinations for admission to the service usually take place twice in the year, *i.e.* in February and August.

The examiners in London will prepare a list in order of merit, with the marks affixed in the different subjects, to be transmitted to the Director-General and communicated to the professors of the Army Medical School. If any candidate is found to be deficient in any particular subject, this shall be stated, in order that he may receive special instruction on the point at Netley.

Pay and Allowance.

The following are the rates of "Indian pay and allowances" which will be drawn by officers hereafter appointed to the Indian Medical Service:—

Rank.	Years' Service.	Indian Pay and Allowances per mensem. When not holding an appointment carrying higher pay. R.	A.	P.
Lieutenant-colonel (senior)	25 and over	900	0	0
Lieutenant-colonel	,,	888	12	0
,, ,,	20 ,,	852	3	7
Major	15 ,,	677	6	11
,,	12 ,,	640	14	6

Rank.	Years Service.	A. When not receiving any Staff Allowance.			B. When receiving Staff Allowance in addition.		
		R.	A.	P.	R.	A.	P.
Captain	10 and over	500	0	0	450	0	0
,, ...	5 ,,	450	0	0	400	0	0
Captain and lieutenant .	under 5	350	0	0	300	0	0

On first appointment they will only come into receipt of "Indian pay and allowances" (Column *A*) from the date of their arrival in India.

Officers holding the principal administrative appointments and substantive military charges of the Indian Medical Service, receive at present the following consolidated salaries:—

	Rs. per mensem.
Surgeon-general, ...	2200 to 3000
Colonel { from	1800
Colonel { to	2250
Lieutenant-colonel of twenty years' service and upwards	1100 with Rs. 90 horse allowance in cavalry regiments.
Lieutenant-colonel, in substantive charge of a native regiment	1000 with Rs. 90 do.
Major, under twenty years' service, in substantive charge of a native regiment . .	800 with Rs. 90 do.
Captain, above five years' full pay service, in substantive charge of a native regiment .	600 with Rs. 60 do.
Captain, or lieutenant under five years' do., in substantive charge of a native regiment .	450 with Rs. 60 do.

The salaries of other substantive medical appointments in the civil and military departments are consolidated, and vary from Rs. 1800 to Rs. 400 per mensem.

Leave Rules.

Officers of the Indian Medical Service, below the rank of surgeon-colonel, may be granted—(1) Privilege leave, under such regulations as may from time to time be in force; (2) leave out of India, for no longer period than one year, capable of extension to two years' absence from duty, on the following pay:—

After arrival in India, on first appointment					£200 a year.
After the commencement of the 5th year's service for pension . .					250 ,,
Do.	do.	10th	do.	. .	300 ,,
Do.	do.	15th	do.	. .	400 ,,
Do.	do.	20th	do.	. .	450 ,,
Do.	do.	25th	do.	. .	500 ,,

(3) Leave in India, but for the period of one year only, on full military pay and half the staff salary of appointment.

Retiring Pensions and Half-Pay.

Officers of the Indian Medical Service will be allowed to retire

on the following scale of pension, on completion of the required periods of service :—

After 30 years' service for pension	. . . .	£700	per annum.
,, 25	,, ,,	. . . .	500	,,
,, 20	,, ,,	. . . .	365	,,
,, 17	,, ,,	. . . .	292	,,

Officers not entitled to pension, when placed on temporary or permanent half-pay, will be granted the British rate of half-pay of their military rank as under :—

Rank.	Rates of Half-pay. Per diem.		Per annum.		
	s	*d.*	£	*s.*	*d.*
Lieutenant-colonel (senior) / Lieutenant-colonel	11	0	200	15	0
Major	9	6	173	7	6
Captain	7	0	127	15	0
Lieutenant	3	0	54	15	0

Officers cannot retire *in India* on half-pay (No. 45, 28th February 1865).

Navy Medical Department.

The regulations for this service correspond very closely to those for the army, with the following exceptions :—

The candidate must also declare his readiness to engage for general service at home or abroad as required.

The official requirements in the natural sciences are as follows :—

Zoology.—The examination in zoology will include the general principles of biology and a comparison of animals with plants ; the distinctive characters of the larger group of animals—the protozoa, cœlenterata, vermes, arthropoda, mollusca, echinodermata, and vertebrata—as illustrated by common types ; the elements of embryology ; animal parasites.

Botany.—The general principles of the morphology and physiology of low forms of life, for example, torula, bacteria, spirogyra, moss, fern ; the general morphology of flowering plants ; diagnosis of the important British natural orders ; medicinal plants.

Physics.—The general principles of mathematics, acoustics, optics, heat, magnetism, and electricity, as : the properties of solids, liquids, and gases ; conservation of energy, specific gravity, propagation and reflection of sound and light, temperature, specific and latent heat, thermometers, properties of mirrors and lenses, chromatic dispersion of light, forms of batteries, galvanic and frictional electricity, general properties of magnets.

Physical geography.—The relation of the earth to the rest of the solar system, nature of the earth's crust ; the chief kinds of rocks : general configuration of land and water, mountains, plains, lakes, rivers, islands, glaciers and icebergs ; the ocean currents, tides, the earth's atmosphere, winds and storms, dew, rain, climate, volcanoes, earthquakes ; general distribution of animal and vegetable life.

Successful candidates, immediately after passing the examination, will receive commissions as surgeons in the Royal Navy, and will undergo a course of practical instruction in naval hygiene, etc., at Haslar Hospital.

Pay and Rank.

Rank.	Daily. £	s.	d.	Yearly. £	s.	d.
Surgeon—on entry	0	14	0	255	10	0
,, after 4 years' full-pay service	0	17	0	310	5	0
Staff-surgeon (or surgeon over 8 years)—on promotion	1	0	0	365	0	0
,, after 4 years' full-pay service in rank	1	4	0	438	0	0
Fleet-surgeon—on promotion	1	7	0	492	15	0
,, after 4 years' full-pay service in rank	1	10	0	547	10	0
,, ,, 8 ,, ,,	1	13	0	602	5	0
,, ,, 12 ,, ,,	1	16	0	657	0	0
Deputy inspector-general	2	2	0	766	10	0
Inspector-general		...		1300	0	0

On first appointment to the service, medical officers will receive full pay from date of appointment, but subject to the provisions of Art. 1342, Clause 2, of the Queen's Regulations, 1893.

The allowance of 5s. a day, in addition to full pay, at present granted to the fleet-surgeon of a flag ship, bearing the flag of a commander-in-chief on a foreign station, will be given to the senior medical officer, being a fleet- or staff-surgeon, and an allowance of 2s. 6d. a day to the senior medical officer, being a fleet- or staff-surgeon, of the ship of a commodore, or of a senior officer commanding a foreign station.

Medical officers conducting the course of instruction at Haslar Hospital will receive the following allowances:—

The senior officer employed upon this duty	£150 a year.
The junior officers assisting	50 a year.

The hospital allowances for naval medical officers at home and abroad, in lieu of provisions for themselves and servants, and for fuel and light, are as follow:—

	At Home.	Abroad
Deputy inspectors-general	£67	£112
Fleet-surgeons and staff-surgeons	53	112
Surgeons	39	108

Medical officers serving afloat receive an allowance of 1s. 6d. a day in lieu of provisions, fuel and lights, as laid down in the King's Regulations. The travelling allowances, extra pay, lodging money, and compensation for losses, are fixed for naval medical officers according to their relative rank in the service.

Half-Pay.

The undermentioned scale of half-pay is substituted for that hitherto in force:—

Rank.	Daily. £	s.	d.	Yearly. £	s.	d.
Surgeon—under 2 years' full-pay service	0	6	0	109	10	0
,, after 2 years' full-pay service	0	7	0	127	15	0
,, ,, 4 ,, ,,	0	8	0	146	0	0
,, ,, 6 ,, ,,	0	9	0	164	5	0
Staff-surgeon (or surgeon over 8 years)—on promotion	0	10	0	182	10	0
,, after 2 years' full-pay service in rank	0	11	0	200	15	0
,, ,, 4 ,, ,,	0	12	0	219	0	0
,, ,, 6 ,, ,,	0	13	0	237	5	0
Fleet-surgeon—on promotion	0	14	0	255	10	0
,, after 2 years' full-pay service in rank	0	15	0	273	15	0
,, ,, 4 ,, ,,	0	17	0	310	5	0
,, ,, 6 ,, ,,	0	18	0	328	10	0
,, ,, 8 ,, ,,	0	19	0	346	15	0
,, ,, 10 ,, ,,	1	0	0	365	0	0
Deputy inspector-general—on promotion	1	5	0	456	5	0
,, after 2 years' full-pay service in rank	1	7	0	492	15	0
,, ,, 4 ,, ,,	1	9	0	529	5	0
Inspector-general	1	18	0	693	10	0

Prison Medical Service.

This branch presents limited opportunities, either for entrance, or for subsequent advancement. The smaller prisons are officered, as a rule, by local practitioners. The medical officers to the larger prisons are appointed by the Convict Prison Board, or the Prison Commission. Special forms may be obtained from the secretary of the latter at the Home Office, on which applications are to be made. In the Convict Service there are eight posts, with salaries ranging from £250 to £550; in the Local Prison Service twenty-eight officers, with salaries from £250 to £500.

Colonial Services.

Applicants for posts under the Colonial Office must be between the ages of 23 and 30, be doubly qualified, and preferably have held hospital appointments. The usual certificates require to be shown, and an official medical examination undergone. Applications for posts or for information are to be sent to the assistant-secretary, Colonial Office. As a rule, about twelve to fifteen vacancies occur annually. In addition to these, a number of semi-official appointments are made yearly by this office, in connection with public works, etc., in the Colonies.

Practitioners Abroad.

In the majority of the British Colonies local registration of legal British qualification suffices to allow a practitioner to pursue the duties of his profession. Only in two (cf. Table VII.)

is this unnecessary; while in one, Ontario, a local diploma must be gained after examination.

A certain number of medical appointments in various Protectorates and Legations are also held under the Foreign Office. Information may be obtained from the Assistant Secretary, Foreign Office.

Few of the foreign nations allow British registered practitioners to practise, unless they first pass the State examinations. Table VII. gives a tabular view of the different regulations current:—

TABLE VII. COLONIES AND COUNTRIES IN WHICH DULY REGISTERED BRITISH GRADUATES AND DIPLOMATES CAN PRACTISE.

1. Without Compulsory Local Registration.

New South Wales, South Australia, Italy (only among visitors and aliens).

2. (*a*) After Local Registration.

Victoria, Tasmania, Queensland, New Zealand (£1, 5s. fee); Western Australia, Natal[1] (£1, 1s. to £3, 3s.); Cape Colony (£5 fee); Prince Edward Island ($20); New Brunswick ($1 to $2 a year); Nova Scotia, Quebec, Manitoba, North-West Territories ($50, and $1 to $2 a year); British Columbia, Jamaica, Klondyke ($50 fee); British Guiana, Fiji, Gold Coast, Gibraltar, Leeward and Virgin Islands, Monaco.

(*b*) After Application for Permission.

Belgium, Greece (examination in French or English); Italy.

3. Only after Examination.

State examinations.—Austria, Denmark, Holland, Germany, Greece, Portugal, Roumania (*viâ vivâ*), Russia, Norway, Spain, Sweden, Switzerland, Brazil (in French or Portuguese).

University or local examinations.—France, Turkey (£4, 10s. fee); Argentine (in Spanish); Chili (*viâ vivâ*); Peru (*viâ vivâ*); Uruguay (*viâ vivâ*); Ontario.

4. America.

Twenty-four States require the passing of an examination; seventeen States require the same, or approval of the diploma presented by the applicant; and in nine, presentation of the diploma or degree is sufficient. The last nine are:—

Alaska Territory, District of Columbia, Michigan, Arkansas, Kansas, Ohio, Arizona Territory, Nevada, Wyoming.

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[1] Annual licence also of £5.

EDINBURGH MEDICAL JOURNAL.

EDITORIAL.

The Care of the Insane. In the *Quarterly Review* for April, an article of considerable merit appears under the above heading. We cannot help feeling, notwithstanding the historical descriptiveness of the article and its air of impartiality, that it is written with a purpose, and that it aims at exposing the antiquated and stereotyped formalities with which lunacy administration south of the Tweed is hampered. The author indulges in pleasantries over the system of inspection of asylums by legal and medical commissioners "hunting in couples," and quotes largely from Sir John Batty Tuke's speech in the House of Commons on this subject. He waxes wroth over the proposal of the Lord Chancellor to increase the numerical strength of the Lunacy Commission by adding another brace of these incongruous officials to its staff. The function of legal commissioners is, he rightly holds, advisory and limited to consultation in the board-room, for, so far as regards intelligent observation and inspection of a disease like insanity, or the numerous medical questions arising in connection with its care and treatment, the legal mind must, with rare exceptions, be at a disadvantage. Like many other Englishmen who have recently written or spoken on this subject, he points triumphantly to the experience of Scotland, where for forty-eight years inspection has been wholly medical, and where, consequently, the proportion of medical inspectors to lunatics is one to between six and seven thousand as against one to thirty thousand in the sister country. When to this is added the fact that all lunatics in Scottish asylums and a large proportion of those in private dwellings are officially visited twice each year instead of once a year as in England, the superiority of the Scottish system becomes obvious. Our author makes another appeal in favour of the Lunacy Laws of Scotland, in so far as the disposal of patients in private houses under what is known as the "six months" certificate is concerned. Under this provision a

lunatic in Scotland may be placed for six months' treatment in a private house on the certificate of one medical man, testifying that the patient is labouring under a curable malady, and does not require asylum treatment. Such a provision is non-existent in England (although a belated Bill to establish it is promised), and as a result innumerable prosecutions have been instituted in the vain hope of stamping out a procedure which is often beneficial, and which, so long as human nature remains as it is, will always be resorted to. The only wonder is that the English legal mind, which is credited with an unextinguishable desire to conserve the liberty of the subject, had not sooner discovered that in this respect the present lunacy laws are actually subversive of this much-belauded principle. The reviewer concludes his article with an unfavourable criticism of the methods of managing large asylums, whereby the energies of the medical staff are dissipated and diverted from their true purpose by the incubus of clerical work and lay administration. The criticism, while apparently just, is, we believe, misdirected. It may be approximately estimated that while about 20 per cent. of the inmates of these county asylums require active and skilled treatment, the remaining 80 per cent. stand more in need of the indirect treatment which results from the control of the administration of the institution by medical men. The claims of the "20 per cent." are, however, paramount, for they form the only material from whose treatment hopeful results may be anticipated. The true solution of the problem is aimed at in the measure recently introduced into the House of Commons by Sir John Batty Tuke for the establishment of Reception Houses in London for the treatment of acute cases of mental disease. That proposal, however imperfect when compared with the German University cliniques or the hospital recently established by the Glasgow Parish Council, is decidedly progressive, and will do more to correct the failures and faults of the lunacy systems of both England and Scotland than any tinkering with the existing condition of institutions can effect.

The State Registration of Nurses.

It would appear to be rather late in the day to argue against the proposed registration of nurses. Now that plumbers and inspectors of nuisances and midwives are all under supervision of one sort or another, there would seem to be nothing whatever to be said against the placing of nurses, the handmaidens of medicine, on the same honourable plane. As a matter of principle, no reasonable objection could be taken. Whilst a certain number of unsuitable women have found their way into the nursing ranks, enough to justify perhaps the recent outburst in "The Nineteenth Century and After," there can be no doubt that, as a whole, those

who have taken up that work have done so from the sense of humanity, and have carried it out with due regard to the great responsibility of their office. It is fitting, then, that this should be recognised by the public, and that the State should give form and body to that recognition.

It is when we come to the practical application of this principle that one or two difficulties appear to arise, none of which we believe to be insuperable. Registration having improved the status of the nurse, will she then be a serious rival of the doctor? It is hard to see how this can be maintained if any clear idea exists as to the proper function of each. We mean no disrespect to the nursing body when we assert that as well might the plumber expect to rival the architect. The sphere of each is perfectly distinct in the mass, overlaps only in minor points of detail, and, speaking generally, neither can well do the work of the other. It is true that where you have youth you have keenness and enthusiasm, leading to visions of the impossible. Thus only to-day we talked with a nurse who was leaving the great hospital in which she had been trained, hoping to enter one smaller and less full of student life, where she might chance on an abscess to open or a cut head to stitch, forgetting that these things did not properly belong to her work, and that in the practice of her profession she would never be permitted by patients to do them. But, speaking broadly, the two professions are complementary in any well-ordered scheme of things, and no man who, to use a vulgarism, "knew the time of day," would dream of opposing the improvement of the nursing body for fear of any competition with medical work. A more difficult matter is to determine properly what is a "nurse." The draft Bill does not help us here by its definition of a nurse, "a man or woman who is registered under this Act." There would appear to be no difficulty whatever in performing all the duties of a nurse without registration, so long as the individual did not practise as, or profess to be, a registered nurse, a function similar to the much-abused "counter practice" of the druggists. And if the thing be pushed to its limit, and everyone who does an odd bit of nursing is forced to register, what is to be done with the "handy wife" of every village? To force all these useful creatures to take a three-years' course of training is to stamp them out of existence, and thus to do a great deal more harm than good, by taking away from the very poor, far away from skilled help, the only help they can possibly obtain. As a matter of fact, this will never be done. The poor we shall always have with us, and their friends will always help them, glory be to God and to human nature! This side of the question, then, demands very lenient treatment—had indeed best be left alone. The main desire and sanction of the Bill is to provide for the inspection and supervision of the skilled nurse, partly for her own advancement, partly for the protection

of the public: but let the rural districts alone to the jurisdiction of the kindly ladies who at present keep a watchful eye on the sick poor, and who at present see to it that the best of these handy women are encouraged to do their work as well as may be.

The proposed Bill, "Nursing and Private Nursing Homes (Registration) Bill (5 Edw. VII.)," is a short enactment providing for the registration of nurses and constituting a Central Board. The constitution of this Board is of some interest. It is a Board in many respects comparable to the General Medical Council, but with this difference, that the representation upon it of the body for which it governs is a preponderating proportion, an absolute majority. The general practitioners of the United Kingdom have five representatives on the General Medical Council. The nurses will have twelve out of twenty-one, or, if the Royal British Nurses' Association and the Jubilee Institute elect women as their representatives, the female element would outnumber the male by exactly two to one, fourteen to seven. This assumes that the "fully trained nurses" referred to in sec. 4 (4) and (5) are female nurses, and this is quite likely to be so. It would have been well that at least one separate representative should have been elected by the male nurses of the United Kingdom, of whom there must be a considerable number, and we should also have expected that the Royal Army Medical Corps, the rank and file of which are trained nurses, would have been directly represented. With these modifications the Bill would appear to fulfil a very useful function, to provide what is distinctly required, a basis, namely, for the placing of a useful body of women on a distinct and definite plane. We wish it well. It will not clear the nursing profession of all of the few undesirables; there will always be foolish women so long as there are bad men: but it will work for good, and will best be welcomed by the best of those for whose welfare it is intended.

Retirement of Professor Simpson from the Chair of Midwifery.

THE resignation by Professor Simpson of the Chair of Midwifery must have been a surprise to most of those who have come in contact with him recently. It has been the subject of general remark that never has he fulfilled the duties of his chair with greater acceptance and success than during the last few years. Professor Simpson, however, has always shown himself to be a man whose actions are controlled by sound principle and generous impulse. We recognise in the voluntary resignation of his chair at the present time no confession of failing energies and loss of interest in his work, but merely a proof of his belief that after attaining three score and ten years, the forefront of the fray may advantageously be taken by younger men. This is a

view with which we fully sympathise. However illustrious a man may be in his profession and as a teacher, there are few who nowadays will not admit that to keep pace with the daily advances in science, and in order to maintain a close correspondence with men and affairs in any branch of medicine, the physical and intellectual vigour of the prime of life is necessary. Professor Simpson retires after thirty-five years of active service, and it will, we believe, be acknowledged on all hands that in his occupancy of the chair, which was adorned by the genius of his illustrious relation, the teaching of obstetrics has not suffered, and the Edinburgh School of Medicine has lost nothing of its great reputation.

His position when appointed to the chair was not without its difficulties. In his path flourished two intellectual giants, Keith and Matthews Duncan, both of world-wide reputation and both pursuing the same branches of study as himself. Gynæcology may be said to have been then practically in its infancy, but advancing with leaps and bounds until it rapidly had a vast literature of its own, and became gradually a new branch of medicine. Professor Simpson not only took part in all the advancements of this rapidly developing science as a teacher, but also as an operator, and we have been assured by a high authority that "he is unquestionably the most skilful operator in the department in Scotland."

Around him he gathered many brilliant assistants, amongst whom may be mentioned Croom, Berry Hart, Barbour, Ballantyne, Clarence Webster, besides many others, and we believe that they would be the first to acknowledge that no small share of their success is to be attributed to the early teaching and guidance of their old master.

It is not, however, only in the lecture theatre that Professor Simpson will be missed. His business qualities and interest in all academic work will make his retirement a loss to the Faculty of which for several years he has acted as Dean with great acceptance, while the student also loses a firm friend and champion of his cause in dealings with the University authorities.

It is a pleasant reflection in recalling the public life of a man extending over the third of a century, that there is no jarring note and no page to be passed over.

Professor Simpson retires with the universal acknowledgment of work well done and with the respect and esteem of the whole profession.

As we have already indicated and now gladly recall, his retirement has not been influenced by any failure of health, so that we may express the hope that the enjoyment of a well-earned cessation from the labours of the chair will not include a retirement from the many social and scientific meetings the success of which his presence in the past has done so much to promote.

Waldeyer's Address.

FROM time to time, in the various departments of science, theories have been advanced and laws enunciated which have exerted a profound influence on scientific thought, by suggesting new lines of research, or by rendering possible a more natural rearrangement and classification of compiled facts. The neuron doctrine is a case in point. The embryological studies of His, the introduction by Golgi of his now well-known silver process, and the elaborate researches of Ramon y Cajal working with this method, furnished a basis upon which Waldeyer founded his theory that the whole nervous system consists of nerve units anatomically and genetically independent.

The neuron theory has been vigorously attacked by Bethe, Apáthy, Nissl, and others, and it was with particular interest that an address from Professor Waldeyer, given by request before the Royal Society of Edinburgh, was awaited. The lecturer outlined in lucid language the origin and history of the neuron theory, and then proceeded to consider in detail the evidence which has been advanced by its opponents. Special reference was made to the work of G. Retzius, Schieffendecker, Bielschowsky, and the more recent discoveries of Ramon y Cajal, which in the opinion of the lecturer weigh heavily against the view of the previously mentioned observers. Even should it be universally proved that the units of which the nervous system appears to be composed, are directly connected by anastomosis (*per continuitatem*), the circumstance ought not, Professor Waldeyer believes, to result in the abandonment of the neuron theory. In the opinion of the lecturer, the existence of cells which act as spheres of influence would be a quite sufficient justification for the retention of the theory.

Honorary Fellows elect at the Royal College of Surgeons.

THE preparations for the celebration of the Fourth Centenary of the Royal College of Surgeons are sufficiently advanced to permit of our commenting upon one of its outstanding features of interest, the bestowal of the Honorary Fellowship of the College. This function is to take place on Thursday, the 20th July, in the M'Ewan Hall, and from the number of Fellows and representatives of distinguished bodies who have intimated their desire to be present, it may be safely affirmed that the ceremony will prove one of the most brilliant as well as one of the most interesting events of the celebration, and worthy of such an historic occasion in the Annals of the Edinburgh Medical School.

The recipients of the Honorary Fellowship are thirty-five in number, and the task of selection has not proved an easy one, for the reason that the number had to be limited, while, on the other hand, it was desired that the list should be representative of as many nationalities as possible.

Seven receive the distinction in virtue of the office which they hold: the Directors-General of the Medical Department of the Navy, the Army, and the Indian Army; the Presidents of the Royal College of Surgeons of England and Ireland, of the Faculty of Physicians and Surgeons of Glasgow, and of the Royal College of Physicians of Edinburgh.

It is a matter of regret that it was considered impossible to extend the honour to many eminent surgeons in the British Isles, but in Lord Lister, one of the oldest Fellows of the College, and by general consent the greatest of living surgeons, British Surgery has at least a representative of whom it may well be proud.

The Honorary Fellows elect from distant parts of the empire and from other countries have been chosen because of their eminence in the profession of Surgery, or of one of its allied branches.

From our near and friendly neighbour across the narrow sea there come: Professor Guyon, "the Master," as he is affectionately called by his pupils, of Genito-Urinary Surgery, whose name is so identified with the reputation of the Hospital Neckar and with the *Annales des maladies des organes génito-urinaires;* Professor Lucas Championnière, who has more than once represented the surgical profession of France at international congresses, and whose name is so well known in connection with the treatment of fractures by massage; Professor Terrier of *la Pitié*, the well-known author and brilliant operator; Professor Paul Segond, the distinguished gynæcologist; and Professor Poncet, who worthily maintains the traditions of the surgical school at Lyons.

From Germany, the country which has done so much for the advancement of surgical science, there come: His Excellency Professor von Bergmann, who has for so long occupied the leading position in the University of Berlin and at the Imperial Court, while as one of the editors of the *Zentralblatt für Chirurgie* and of the "Handbuch der praktischen Chirurgie," his name is known throughout the surgical schools of the world; Professor Czerny of Heidelberg, though popularly identified in this country with the suture which bears his name, has greater claims to international eminence because of his numerous contributions to surgical literature, especially those relating to the surgery of the alimentary canal; Professor König, formerly the head of the great *Charité* in Berlin, is the well-known author of what is probably the best surgical text-book extant, and the greatest living authority on diseases of the bones and joints; and lastly, Professor Bier, who, although comparatively a young man, has achieved a world-wide reputation by his observations on the treatment of pathological states by the induction of hyperæmia.

From Austria we have Ernst Fuchs, the celebrated Professor of Ophthalmology in the Imperial University of Vienna, and

Freiherr von Eislesberg, the worthy successor of Billroth in the Chair of Surgery of the same University.

From Italy there is the Director of the Surgical Clinique in the Royal University of Rome, Professor Francesco Durante, the author of a monumental work on Surgical Pathology and Therapeutics, whose name is especially identified with the Surgery of the Central Nervous System; from Switzerland, Professor Kronlein, the acting president of the German Surgical Society; from Sweden, Carl Gustav Lennander, the Professor of Surgery at Upsala, well known by his writings on the Surgery of the Peritoneum; from Denmark, Professor Saxtorph of Copenhagen; from Russia, Professor Subbotin; and from Finland, Professor Bruno Krogius.

The choice of representatives from the United States was a difficult one, on account of the very large number of distinguished names identified with surgery in that continent; necessity has limited the number to five: Halsted of Baltimore, Keen of Philadelphia, Mayo of Rochester, M'Burney of New York, and Warren of Boston.

The part played by Japan in the advance of surgery is recognised by the selection of Baron Yasuzumi Saneyoshi, Director-General of the Imperial Japanese Navy.

Lastly, from our own colonies will be welcomed Professor Shepherd of Montreal, Professor Cameron of Toronto, Dr. Fitzgerald of Melbourne, and Dr. MacCormack of Sydney.

It is our sad duty to chronicle the death on the 14th June of one of the most distinguished of those we had hoped to honour and welcome at our celebrations, Professor Johannes von Mikulicz-Radecki of Breslau. Wherever surgery is taught or practised, the name of Mikulicz not only recalls the memory of one who was in the very front rank as a teacher and as a surgeon, but of one who by his indomitable energy and charm of character had earned the affection as well as the regard of his professional brethren.

ORIGINAL COMMUNICATIONS.

BRADYCARDIA.[1]

By G. A. Gibson, M.D., D.Sc. (Edin.), LL.D. (St. And.), *Physician to the Royal Infirmary, Edinburgh.*

Diminution of the rate of the heart beat, whether persistent or intermittent, is certainly not an observation of yesterday. It was a symptom well known to Galen, as may be seen in several of his works on the pulse;[2] no definite standard for measuring it, however, was employed till Kepler, as we learn from Haller,[3] suggested the idea of counting the number of pulsations in a minute. Morgagni[4] gave an excellent description of it, and narrated some admirable cases in point; Adams,[5] Burnett,[6] Holberton,[7] and Stokes[8] aroused new interest in the condition, and, during the fifty years which have elapsed since the last-mentioned physician published his masterpiece, several authors have produced important observations upon the subject. As the present contribution makes no pretensions to be in any way an historical inquiry, only the names of those who have made real additions of value to our knowledge will be mentioned, and their observations will be referred to in connection with the particular aspects of the subject to which they have specially devoted attention.

Definition.—The term bradycardia, originally suggested by Grob,[9] has in recent years been employed to denote reduction of the rate of the heart beat below the normal limits of health. As the heart beat varies in rate with age, sex, and size, it must be obvious that the line separating the normal from the abnormal cannot be other than a somewhat variable standard. We may, however, assume that in the male adult any rate below fifty per minute is pathological. Bradycardia, like tachycardia, is purely a symptom, and should never be regarded as a disease. As will be seen in the sequel, several distinct varieties of clinical phenomena are included under the general term.

Etiology.—The causes of diminished rate of the heart beat are

[1] Read at the British Medical Association, Oxford, July 29, 1904, and at the Medico-Chirurgical Society, Edinburgh, February 1, 1905.

[2] "Περί διαφοράς σφυγμῶν," βιβ. α. "Galeni Librorum, Pars tertia," 1538, p. 10. Translated into Latin in "De differentiis Pulsuum," lib. i. "Opera omnia," 1542, tomus iv, col. 183.

[3] "Elementa Physiologiæ," 1760, tomus ii, p. 259.

[4] "De Sedibus et Causis Morborum," 1762, tomus i, p. 70; tomus ii, p. 420.

[5] *Dublin Hosp. Rep.*, 1827, p. 448.

[6] *Med.-Chir. Trans.*, London, 1827, p. 202.

[7] *Ibid.*, 1841, p. 76.

[8] "Diseases of the Heart and Aorta," 1854, p. 302.

[9] *Deutsches Arch. f. klin. Med.*, Leipzig, 1888, Bd. xlii. S. 574.

numerous, and, in order to have a thorough understanding of the different factors inducing the characteristic group of appearances, it is convenient to divide them into two classes. To the first belong all the various influences which produce the conditions of the circulatory apparatus leading to the disturbance of function now under consideration; in the second are the special alterations in cardiac activity which give rise to the clinical results. The former group of causes, which may be called extrinsic, to be considered in this part of the paper; the latter, to which the term intrinsic may be applied, will be more appropriately dealt with under the head of pathology.

To the first or extrinsic group of causes much attention has been given by many authors, amongst whom may be mentioned Grob,[1] Huchard,[2] Morison,[3] Ogle,[4] Edes,[5] and Osler.[6] The classification of the different factors has been pursued with much zeal, and although some divergences naturally occur in the views expressed by the various writers, there is a general agreement as to the principles on which the arrangement of these causes is based. The following classification appears to me at once simple and comprehensive, and it agrees in the main with the general trend of opinion held at present. In presenting this summary, it is quite unnecessary to cite those who have laid most stress upon the different factors.

The condition may depend upon personal idiosyncrasy—sometimes purely an individual peculiarity; in other instances the expression of a family tendency. Examples of each are by no means uncommon, and occur in conditions of perfect health otherwise, even in young athletes. How the condition is produced in such instances must often be matter for speculation, but probably the nervous system is the dominant factor. In such cases it is to be borne in mind that the bradycardia is usually not of a pronounced type.

Definite nervous influences are weighty agencies in diminishing the rate of the heart. Amongst the causes thus operative it will be convenient first to consider structural lesions. Amongst such organic changes, tumour and abscess of the brain, sinus thrombosis and meningitis, diseases and injuries to the upper part of the spinal column, and pressure upon the trunk of the vagus in the neck, are of greatest importance. Reflex influences arise from the various organs, and are mostly connected with pain or stress —from the heart itself when labouring strenuously against heavy

[1] *Loc. cit.*

[2] Huchard has written numerous papers on the subject, but these may all be consulted in his classical work, "Traité clinique des Maladies du Cœur et des Vaisseaux," 2me édit., 1893, p. 321.

[3] *Lancet*, London, 1895, vol. ii. p. 1281.

[4] *Ibid.*, 1897, vol. i. p. 296.

[5] *Trans. Ass. Am. Physicians*, 1901, vol. xvi. p. 521.

[6] *Lancet*, London, 1903, vol. ii. p. 516.

odds; from the lungs in affections of the pleura, parenchyma, or tubes; from the liver or its ducts in inflammatory lesions or calculous disorders; from the stomach in catarrhal, ulcerative, or obstructive disturbances; from the intestines in catarrhal conditions and peristaltic disturbances; from the kidney in presence of a calculus, or of undue mobility; nay, even disorders of the pelvic viscera may be the starting-point of reflex influences affecting the rate of the heart. Under the head of functional causes may be grouped those associated with melancholia, hysteria, and hypochondriasis; as to the method of action of these conditions, there is nothing but speculation to occupy our attention, but it is probable that faulty chemistry is as much concerned with the pulse changes as nervous influences. Finally, amongst nervous agencies, it is undoubted that the influence of the will has to be reckoned with. Well-authenticated cases are on record in which voluntary diminution of the rate of the heart has been produced, not only by Oriental fakirs and other fanatics, but by men of Western race and modern education. Direct drains from the system, as in hæmorrhage and other discharges, have also to be placed here, as acting mainly through the nervous system.

Toxic agents exert a most powerful influence upon cardiac frequency, and the symptom is found as the result of metallic poisoning, as in plumbism, where the effect is chiefly produced by acting on the vessels; in vegetable poisoning, as by digitalis and tobacco, where the effect is seen both on vessels and heart; in microbic poisoning, as in influenza, diphtheria, and enteric, where both circulatory and nervous systems suffer; and in metabolic poisoning, as in the auto-intoxication of constipated, uræmic, puerperal, and exhausted persons, in all of whom the influence appears to be exerted through the nervous as well as the circulatory organs.

Lastly, there are conditions altogether confined to the circulatory system—in considerable rise of pressure, such as may be found in arterial hypertonus, vascular sclerosis, and cardiac degenerations. Under one or other of these various causes every factor leading to the symptom under consideration may be placed. Probably in most cases the causation of the symptom involves more than one of the influences which have been thus briefly enumerated.

Semeiology.—An extensive field of observation has given me opportunities for the study of numerous cases showing the symptom in all the forms that have been recognised, and produced by most of the causes which have been suggested. Before attempting any sketch of the clinical features attendant upon the symptom, it will be helpful to premise that in certain cases the whole heart participates in the diminished rate of pulsation, *i.e.* the auricular and ventricular portions of the heart both manifest infrequency of action. This is commonly, but not uniformly, the

condition found in the cases of nervous and toxic origin. On the other hand, the symptom is frequently found to depend upon a loss of conduction of the pulsation from the auricles to the ventricles; in other words, the diminution of rate is caused by lessened frequency of ventricular action. This is most characteristic of those cases in which the condition is the result of arterial degeneration with interstitial myocarditis. The examples which are given in the sequel have been selected from this latter class as being of much greater interest than the former, especially in view of their probably aiding in the solution of some questions now being keenly discussed.

There may be an absolute latency of all symptoms save the one central fact of infrequent heart beat and arterial pulse. This is seen most particularly in the infrequent pulse of the apparently healthy. In most instances manifesting the symptom there are attendant phenomena which must engage our attention.

As regards the circulatory system itself, there may be no symptoms, but it is common to find some breathlessness on exertion and sensations of palpitation or tremor. Occasionally such overwhelming accompaniments as angina may be experienced. Pallor is common; the arteries may show healthy or degenerative conditions; the vessels may be turgid or empty; the pressure may be high or low, and the pulsation may be regular or irregular according to the various circumstances which are present. As a general rule, the heart is enlarged, but this is not invariable; its impulse may be strong or weak, and the sounds may be clear or obscured by different murmurs; of these, the most common are systolic murmurs at the great venous orifices. In all these cases the point which will be found of greatest interest is the comparison of the movements of the vessels in the neck and the apex beat.

The digestive system is often found in a condition of disturbance which commonly stands in an etiological relation to the cardiac disorders. Gastro-enteric catarrh, with its usual symptoms, is frequent. It need scarcely be added that in certain grave cases the peritoneum may be involved by transudation. In a certain number of cases examination of the respiratory organs yields characteristic results—breathlessness and cough are common, the latter being accompanied by a thin frothy expectoration. The explanation of these phenomena is found in the presence of hyperæmia or œdema of the lungs. But there are many cases of long-standing diminution of rate in which the respiratory organs are quite intact. Disturbance of the functions of the kidneys is common. Polyuria, albuminuria, glycosuria—any one of these may be present, according to the special group of circumstances in which the symptom has made itself manifest. The skin, as has already been mentioned, is often pale, but this is by no means a constant phenomenon, and there are instances in which flushing

is to be seen. All such appearances are obviously the result of disturbance of the vasomotor nervous system.

In one particular form in which the heart beat is reduced, nervous symptoms are prominent. In the paroxysmal type the attacks are frequently accompanied by various nervous diseases. Transient attacks resembling *petit mal,* in the form of brief lapses in the continuity of consciousness, or short periods during which the memory is found to be enfeebled, are often observed. Such minor symptoms are often surpassed by attacks of faintness and giddiness passing on to complete syncope. In other instances all the appearances of ingravescent apoplexy may be observed, and in yet other instances there may be convulsive seizures of an epileptiform type.

There are three distinct forms in which the symptom under consideration shows itself. In the first place, there is a well-known type characterised by the occurrence of transient attacks of infrequent cardiac action with a normal rate at other times. This is seen particularly in the paroxysms of the "Adams-Stokes syndrome," as the complex of symptoms is commonly termed. In the second place, a persistent condition of low rate of heart beat is universally recognised. It is not suggested by the use of the term persistent that the condition is permanent, simply that it continues for a period of some duration, as in the case of the infrequency of pulsation after some of the infections. In the third place, with a persistently infrequent heart beat, there are paroxysms of still greater reduction of the rate of the cardiac pulsations. No doubt all these varieties are linked together by numerous intermediate degrees of impaired activity, but these three forms can be clearly recognised as the central types. The more searching investigation of the agencies by which in some instances the whole heart is implicated in the lessened rate of action, while in others the ventricles alone are concerned, will be considered in the next section.

From my records of cases showing great reduction of heart rate, only three of the most noteworthy have been selected for description in this paper. They belong without exception to the type depending upon definite arterial and myocardial changes, and they have been chosen because cases belonging to this category afford a much better opportunity than any others of thoroughly studying, not only the extrinsic causes, but also the intrinsic mechanism, by which the phenomena are produced. Along with them another case is recorded to form a contrast. It is one in which there was great irregularity and inequality of the cardiac pulsations, which at times were so feeble as to simulate the appearances of definite and considerable reduction of rate.

Case 1.—A physician, æt. 80, has been seen frequently along with

Dr. Church and Professor Wyllie. Four years ago he was seized in the train near Edinburgh by an attack of unconsciousness with epileptiform movements. When seen shortly afterwards by Dr. Wyllie and myself, the pulse rate was 16 per minute, the heart sounds were feeble, and obscured by systolic murmurs, both mitral and tricuspid. There was no actual loss of consciousness, but the patient was drowsy and tired. There was considerable gastro-enteric disturbance, and in our opinion this was the exciting cause of the attack. In a few days the condition had become quite normal, and the pulse returned to its usual rate of about 60. Several similar attacks occurred during the next two years, during one of which the pulse rate fell to 9 per minute. After the last seizure the rate of the pulse became permanently low, ranging from 23 to 27 per minute.

The patient looks healthy, and is able to take a keen interest in everything. The digestion, although rather sluggish, is fairly good. The radial arteries are hard and resistant, but not distinctly tortuous. The vessels are fully distended. The pressure is 210 mm. Hg. Each pulsation is quick, but sustained. The rate is 25; the rhythm regular. There is some pulsation in the jugular veins, and the movements obviously take place more frequently than the impulse of the apex; at least two, and sometimes three, jugular pulsations occur for every apex beat. The heart has a forcible beat in the fifth left intercostal space just about the mammary line; the lateral borders of the heart are $2\frac{1}{2}$ in. to right and $5\frac{1}{2}$ in. to left of midsternum. Auscultation reveals a loud blowing murmur at the apex, and another, softer in character, at the junction of the xiphoid cartilage and the sternum. There is no basic murmur, and none is propagated into the carotid vessels. The second aortic sound is loud and clear, with no attendant murmur. Between the second sound and the following systolic murmur there can always be heard at least two faint but distinct sounds. It has always seemed to me that these sounds are caused by the systole of the auricles, and Professor Wenckebach, of Groningen, with whom I had the pleasure of seeing the patient, agrees with me in this conception. Tracings obtained from the radial pulse show a quick ascent and a slow descent. The form of the pulse wave is almost like

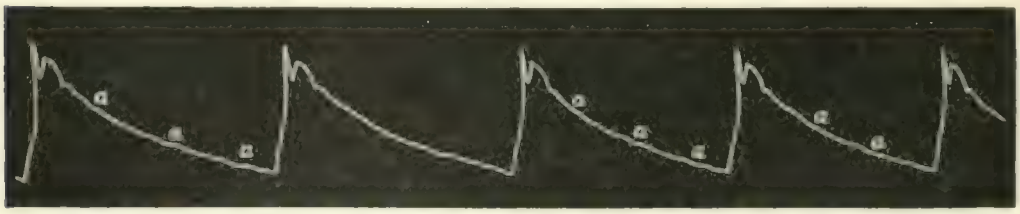

Fig. 1.—Tracing from the radial artery in Case 1.

that described as the pulsus bisferiens. It will be observed that there are little waves on the line of descent, marked with the letter "a," the significance of which will be discussed in the following section. A tracing from the radial pulse is shown in Fig. 1. Simultaneous tracings obtained from the jugular vein and the radial artery show pulsations of the vein in the interval between the pulsations of the radial artery.

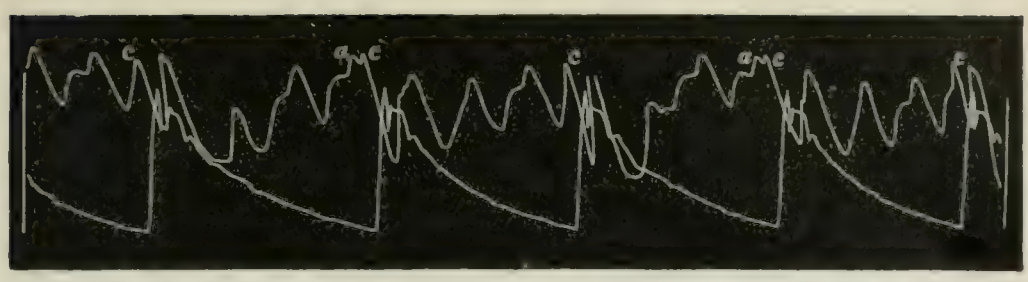

Fig. 2.—Tracing from the jugular vein (upper curve) and radial artery (lower curve) in Case 1.

These may be observed in Fig. 2. Simultaneous tracings of the apex beat and of the radial pulse are exhibited in Fig. 3. It will be noticed that the cardiac pulsation exhibits a negative movement, and that besides the systolic subsidence there are small intermediate positive

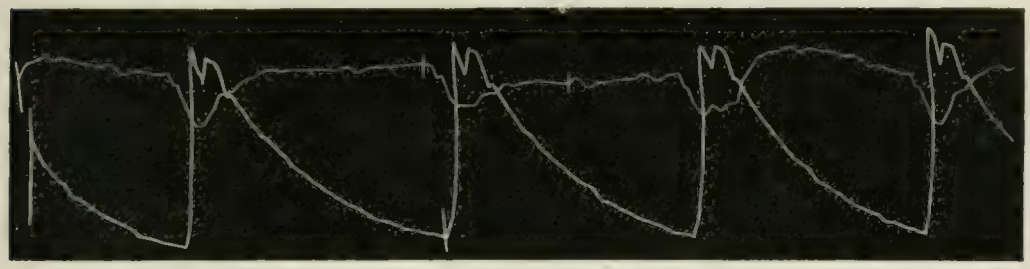

Fig. 3.—Tracing from the apex (upper curve) and radial artery (lower curve) in Case 1.

waves. The explanation of these waves will be taken up along with the other features which have to be discussed in the sequel.

Case 2.—A jeweller, æt. 68, has been seen two or three times along with Dr. George Mackay. He has for some time complained of frequent attacks of faintness, and has more than once been attacked by serious vertigo, as the result of which he has actually fallen in the street. The patient is a man of ruddy complexion and healthy aspect. The arteries are rigid and tortuous, showing turgidity and high pressure. The pressure of the pulse is 150 mm. Hg; the rate is 34 per minute. On inspection of the chest nothing is to be seen except a diffuse apex beat somewhat further to the left than usual. The borders of the heart are 2 in. to the right and 5 in. to the left of midsternum. On auscultation, a loud systolic murmur obscures the first sound over the whole præ-

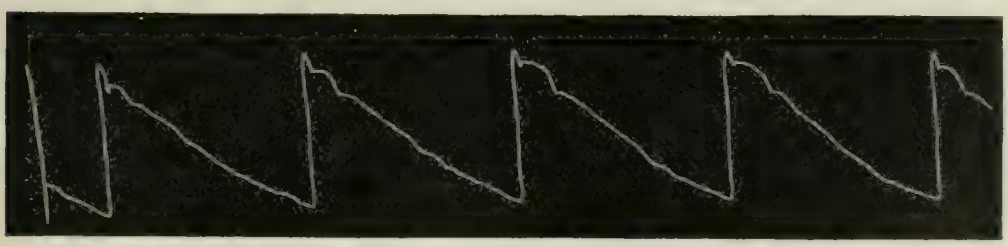

Fig. 4.—Tracing from the radial artery in Case 2.

cordia, but its maximum intensity is situated at the apex. The second sound is loud, especially in the aortic region. Between the second

sound and the following systolic murmur faint but distinct sounds can be heard. The tracing of the radial pulse shows a quick ascent and a slow descent. The tidal wave is situated high up on the line of descent, but the pulse tracing does not approach so closely to the features of the pulsus bisferiens as that from the previous case. These features may be seen in Fig. 4. Simultaneous tracings from the jugular vein and the radial pulse, Fig. 5, show that there are distinct pulsations of the

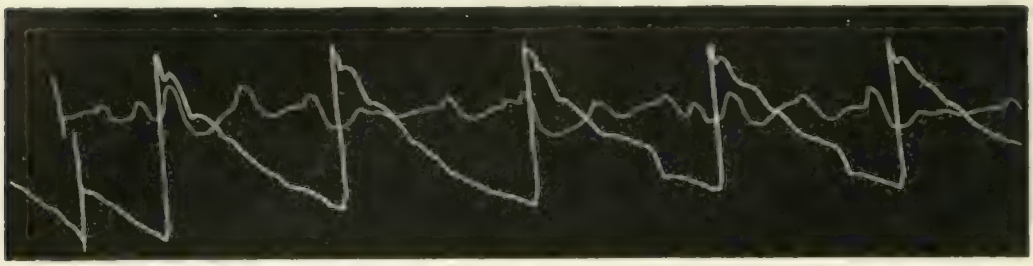

Fig. 5.—Tracing from the jugular vein (upper curve) and radial artery (lower curve) in Case 2.

vein between those of the radial artery. On examining the lungs, there is no implication in any way, there being no change on percussion or auscultation. The renal functions are likewise perfectly healthy, and there is no obvious interference with the digestion.

Case 3.—A cabman, æt. 55, was sent into my ward in the Royal Infirmary by Dr. W. T. Ritchie, complaining of shortness of breath with cough and pain in the chest. His antecedents have been satisfactory, but he has for long been in the habit of taking somewhat more than the average amount of alcohol, and his work has necessarily exposed him to every extreme of climate. He has suffered from acute pneumonia on two occasions, and has had several attacks of bronchitis. During the last two years he has had attacks of faintness occurring at varying intervals, and during the same period has had severe pain in the chest, with a sense of constriction. The arteries are thickened and nodular, but not distinctly tortuous. The vessels are turgid and the pressure is high, being equal to 170 mm. Hg. The rate of the pulse is 36 per minute, and it is perfectly regular. On examination, a distinct impulse is seen in the sixth intercostal space close to the anterior axillary line. The borders of the heart extend 2 in. to the right and 5 in. to the left of midsternum. On auscultation, there is a loud blowing systolic murmur heard over the whole præcordia and propagated for a considerable distance in every direction over the chest. The maximum intensity of this murmur is in the mitral area. No other murmur is audible. The

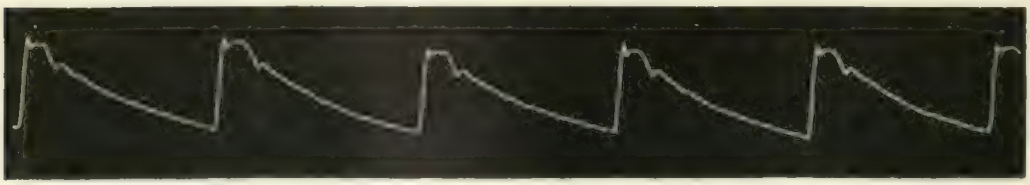

Fig. 6.—Tracing from the radial artery in Case 3.

second sound is clear and ringing, especially in the aortic region; it is sometimes reduplicated. There are no pulmonary symptoms, and the physical signs of the chest reveal no abnormality. The renal functions

are healthy. As regards the digestive system, there is slight increase in the size of the liver. The nervous system gives no obvious symptoms except the faintness, giddiness, and pain already mentioned. The radial pulse yields a tracing showing a quick ascent and a slow descent.

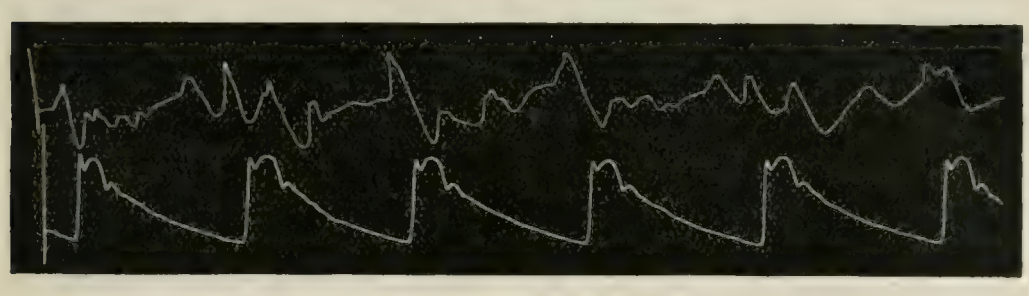

Fig. 7.—Tracing from the jugular vein (upper curve) and radial artery (lower curve) in Case 3.

In its features, shown in Fig. 6, it closely resembles the pulsus bisferiens. It has a few little waves on the line of descent. Simultaneous tracings of the jugular and radial pulses, shown in Fig. 7 and Fig. 8, show distinct undulations of the venous pulse between the radial pulsations, and the same may be said of the simultaneous tracing, Fig. 9,

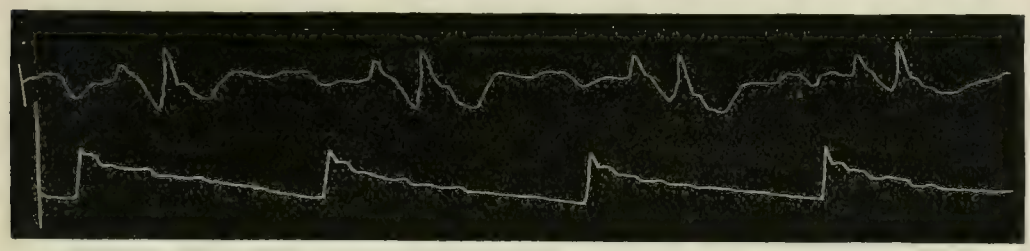

Fig. 8.—Tracing from the jugular vein (upper curve) and radial artery (lower curve) in Case 3.

obtained from the apex and the radial artery. In each cycle there is a distinct wave seen in the apex beat intermediate between the principal pulsations.

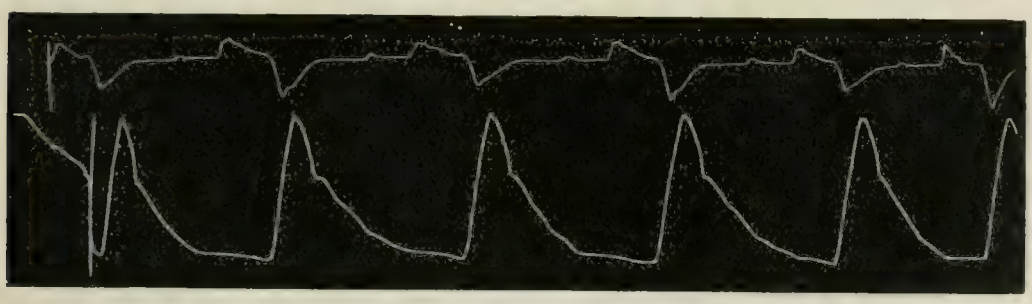

Fig. 9.—Tracing from the apex (upper curve) and radial artery (lower curve) in Case 3.

Case 4.—A plumber, æt. 50, was sent into my ward by Dr. Elmslie Henderson. The only point in regard to his heredity which bears upon the present connection is that his mother died suddenly at the age of 56 of heart disease. His occupation has exposed him to the influence of lead in many ways. He has had the usual children's diseases, and he has suffered from erysipelas and eczema. He has been very intemperate

as regards alcohol, and has also smoked heavily. Three years ago he laboured for some time under distinct effects of lead poisoning. About two years before admission he noticed that he was troubled by breathlessness, and to this was added the occurrence of attacks of giddiness. He observed that the breathlessness was mostly experienced on exertion, while the giddiness came on at any time, even early in the morning. Recently there has been some swelling of the legs, and an attack of influenza, which occurred two months before admission, rendered his condition so grave that he was glad when his doctor proposed to send him into hospital.

The patient is found to have some cyanosis but no dropsy. He shows some traces of the lead line on his gums, and he has a most obvious arcus senilis. There is occasionally some pain about the shoulders. This is attended by palpitation, and these symptoms along with breathlessness are most liable to occur on exertion. He has never had any feeling of faintness. The arteries are decidedly thickened and somewhat tortuous. The pressure is moderate, being equal to 130 mm. Hg. The rate of the pulse is very variable, its limits being 42 and 132; it is extremely irregular and unequal. There is a distinct venous pulsation in the neck, as well as pulsation in the episternal and epigastric regions. The pulsation in the vessels of the neck shows a distinct double movement, and the second impulse is carried up over the angle of the jaw to the cheek. The apex beat is in the fifth intercostal space. The cardiac borders are 2 in. to the right and 5 in. to the left of mid-sternum. There is a loud blowing systolic murmur extending over the whole præcordia, and carried outwards into the axillary region. It has its point of maximum intensity at the apex. A separate systolic murmur can be heard in the aortic region, which is propagated up the arteries of the neck. The chest shows some crepitations at the bases of both lungs, otherwise there is no abnormality. There are no evidences of renal implication. The nervous system shows some increase of the myotatic irritability.

Strictly speaking, this case has no place as an example of the symptom under discussion; but some of the tracings which have been obtained throw light upon certain of the questions requiring elucidation.

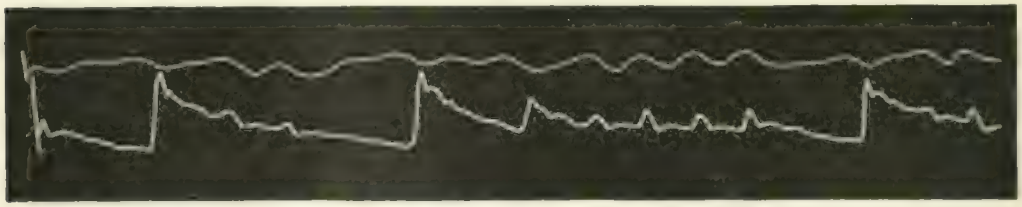

FIG. 10. Tracing from the jugular vein (upper curve) and radial artery (lower curve) in Case 4.

Two of these tracings are annexed. Fig. 10, taken from the jugular vein and the radial artery, shows a number of small impulses intermediate between the larger pulsations, and these are accompanied by distinct venous movements. Fig. 11, from apex and artery, shows in the curve from the apex a large number of small impulses, some of which are attended by a fully developed radial pulse and some by a small wave. It is interesting to observe that the pulsation of the apex,

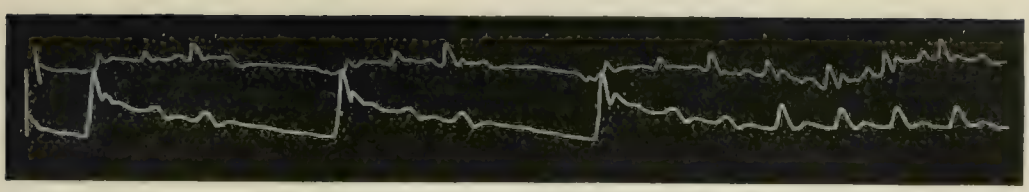

FIG. 11.—Tracing from the apex (upper curve) and radial artery (lower curve) in Case 4.

which is accompanied by the large radial pulse, is actually smaller than certain of the other pulsations which give rise to an almost abortive radial pulse. The exact bearings of these facts will be dealt with in the following section of this paper.

Pathology.—It would serve no useful purpose to enumerate the different morbid appearances found after death in cases which have shown marked diminution of the rate of cardiac pulsation. Suffice it to remark that the anatomical changes are as numerous as they are inconstant. It will be of greater utility to seek to understand the intrinsic influences by which the modifications of rate are brought about, and to this aim the present section will be devoted. Some physiological considerations must be referred to. The view of Haller[1] that the cardiac movements are caused by the inherent power of contraction of the heart itself, after being largely overshadowed by the conception that the nervous elements alone were the agencies producing the pulsation, has, during the last five-and-twenty years, been again almost universally accepted, for reasons which have been fully stated by myself on other occasions.[2] The rhythmic action of the heart begins in embryonic life before there is any trace of specialised tissue, whether muscular or nervous. All the recent speculations, therefore, as to whether the inherent cause is myogenetic or neurogenetic are beside the mark. In my opinion, however, those who uphold the myogenetic theory are nearest to the absolute truth. One of the most important advances in the study of the heart was the discovery by Gaskell[3] of a direct and continuous connection of the sinus, the auricle, and the ventricle in the heart. This has been amply confirmed in recent years; the observations of His[4] and of Ewald[5] being the most important since Gaskell's discovery appeared.

The remarkable work of Gaskell[6] gave a great impetus to the study of the cardiac movements. In his different contributions

[1] "Elementa Physiologiæ," 1757, tomus i, p. 430.

[2] "Diseases of the Heart and Aorta," 1898, p. 60, and "Nervous Affections of the Heart," 1904, p. 54.

[3] *Arch. de physiol. norm. et path.*, Paris, 1888, iv. sér., tome i, p. 56.

[4] *Arb. a. d. med. Klin. zu Leipzig*, 1893, S. 23.

[5] "Ein Beitrag zur Lehre von der Erregungsleitung zwischen Vorhof und Ventrikel des Froschherzens," 1901, S. 12.

[6] The investigations referred to are contained in several papers by Gaskell, but the principal facts are collected together in one most important contribution—*Journ. Physiol.*, Cambridge and London, 1883, vol. iv. p. 43.

he pointed out that the spontaneous rhythmic stimulus, excitability, contractility, and conductivity of the cardiac movements required separate study, and he further showed that interference with the heart's action might be produced by a modification of any one of these properties. He further demonstrated most clearly that the different parts of the heart have physiological peculiarities of their own, but that in all these it is merely a question of degree and not of kind. In this investigation of the properties of the cardiac muscle he has been followed by Engelmann[1] who, some years later, systematised, so to speak, these remarkable discoveries by assigning to each of them a distinctive term. These physiological considerations must be kept in view in order to facilitate the elucidation of some of the questions which will arise in the sequel.

Sometimes, as in the examples produced by cerebral affections or by interference with the trunk of the vagus, the whole heart—auricular as well as ventricular—participates in the lessened rate of pulsation. Here there is, as a rule, no difficulty in arriving at a perfectly definite cause for the condition. Any influence which operates on the auricular sinus so as to retard the pulsation originating there, will, unless there is some grave disturbance of conductivity, control the rate of pulsation of the entire heart. It must be obvious that such a cause may lie either in a reduction of the stimulation—the negative chronotropic effect of Engelmann,[2] or in a lessening of the excitability—the negative bathmotropic effect of the same author. Into such conditions it is not the purpose of the present contribution to enter, seeing that the cases which have to be discussed are not examples of these conditions.

The appearances presented by three of the four cases which have been narrated form a group differing in every way from that in which the whole heart takes part in the reduced rate of pulsation. Such appearances did not escape the acute observation of Stokes,[3] who, in his great work, clearly makes note of them. In these first three cases it must be obvious to everyone, from the numerous jugular pulsations unattended by any radial pulse, that the auricles either beat more frequently than the ventricles, or that some of the ventricular pulsations which follow those of the auricles are too feeble to produce anything more than an abortive arterial pulse. For the explanation of such appearances it is necessary once more to turn to Gaskell,[4] who demonstrated "that

[1] Engelmann has published many papers on the subject. The following are the chief:—*Arch. f. d. ges. Physiol.*, Bonn, 1892, Bd. lii. S. 357; *Ibid.*, 1894, Bd. lvi. S. 149; *Ibid.*, 1895, Bd. lix. S. 309; *Ibid.*, 1896, Bd. lxii. S. 543; *Ibid.*, 1897, Bd. lxv. S. 109 and S. 535; *Cinquantenaire de la Société de Biologie*, 1899, p. 86; *Arch. f. Physiol.*, Leipzig, 1902, S. 103 and S. 443; *Ibid.*, 1902, Supp. S. 1; *Ibid.*, 1903, S. 109.

[2] *Cinquantenaire de la Société de Biologie*, 1899, p. 86.

[3] "Diseases of the Heart and Aorta," 1854, p. 302.

[4] *Op. cit.*, p. 121.

a block can be produced, either by artificial section of the auricle or by an increase in the natural block at the auriculo-ventricular junction, such that only every second contraction which starts from the sinus passes over the block." Chauveau[1] brought forward facts bearing upon the dissociation of auricular and ventricular rhythm; Vaquez and Bureau,[2] from an interesting study of cardiac, radial, and cervical pulsations, showed distinctly that a block occurred; Moritz[3] explained the small pulsations occurring in a cardiogram synchronous with the jugular pulsation as produced by auricular contraction. His[4] showed that the heart block might be produced by a lesion of the ventricles, by a disturbance of the vagus nerve, or by a damage to the conducting fibres. Lichtheim[5] gave tracings of a case of heart failure with a pulse of 32, in which three jugular pulsations occurred for one apical and one radial pulse, and appears to have no doubt that the auricle pulsates three times for each ventricular action. Mackenzie[6] has clearly demonstrated complete heart block, and believes that the little waves occurring between the principal impulses are produced by auricular contraction, and this has been unhesitatingly accepted by Wenckebach.[7] On the other hand, Hoffmann[8] is rather doubtful about the occurrence of heart block in such cases, and Webster[9] fully discusses the question whether these small pulse waves are produced by auricular or ventricular contraction, evidently with a bias in favour of an abortive systole of the ventricle. Jaquet[10] takes up a position of absolute antagonism to heart block. Undoubtedly the question is hedged about by several difficulties, the chief element of doubt centring in the question whether the left auricle can communicate a pulsation through the left ventricle so as to produce an impulse in the column of blood in the aorta while the aortic cusps are closed. To my own mind this has presented much difficulty. And yet the auricles are capable of producing exceedingly definite results. It must be recalled that, many years ago, the fact that the auricle in health can produce a distinct sound on contraction was demonstrated by Malet and myself.[11] The force exhibited by the presystolic thrill and murmur in cases of mitral and tricuspid obstruction, and the behaviour of the right auricle in obstruction of the right auriculo-ventricular opening, giving a distinct hepatic impulse, as Mackenzie[12] has shown, are proof of the

[1] *Rev. de méd.*, Paris, 1885, tome v. p. 161.
[2] *Compt. rend. Soc. de Biol.*, Paris, 1893, p. 170.
[3] *St. Petersb. med. Wchnschr.*, 1897, S. 301.
[4] *Deutsches Arch. f. klin. Med.*, Leipzig, 1899, Bd. lxiv. S. 316.
[5] *Deutsche med. Wchnschr.*, Leipzig, 1902, Bd. xxviii., Ver. Beitr., S. 69.
[6] *Brit. Med. Journ.*, London, 1902, vol. ii. p. 1411.
[7] "Die Arythmie," 1903, S. 148.
[8] *Ztschr. f. klin. Med.*, Berlin, 1900, Bd. xli. S. 357.
[9] *Glasgow Hosp. Rep.*, 1901, pp. 420 and 454.
[10] *Deutsches Arch. f. klin. Med.*, Leipzig, 1902, Bd. lxii. S. 77.
[11] *Journ. Anat. and Physiol.*, London, 1879, vol. xiv. p. 4.
[12] "The Study of the Pulse," 1902, p. 195.

possibilities of this part of the heart. On a careful review of the subject in all its bearings, the conclusion has been forced upon me that the sounds heard during the interval, as well as the small waves in the cardiographic and sphygmographic tracings, are produced by auricular pulsation alone. In other words, that such cases can only be explained by the existence of a complete heart block. There is no need in cases of this kind to invoke any nervous influences. The essence of the condition lies in a disturbance of conductivity—a primary negative dromotropic influence in the phraseology of Engelmann: a lesion at "Gaskell's bridge."

The fourth case which has been described in this paper is only included with the view of showing a complete contrast. It gives an irregular series of jugular, apical, and radial pulsations, in which there is no block, and the state of matters can be explained by the arhythmic occurrence of premature systoles. The extreme irregularity of the cardiac cycles forms a striking contrast to the monotonous regularity of the movements in the other three cases. It is a good example of arhythmia with a frequent failure on the part of the ventricle to send a valid pulse wave as far as the radial. It is the condition sometimes termed false bradycardia.

We know from the investigations of Gaskell,[1] and also from those of Roy and Adami,[2] that the ventricles may assume a rhythm independent of the pulsation of the auricles. In conditions similar to those existing in Case 4, such a result may sometimes be seen. The tracing shown in Fig. 12 gives a complete demonstration of ventricular systole occurring without any previous pulsation of the auricles. It is taken from my "Morison Lectures."[3]

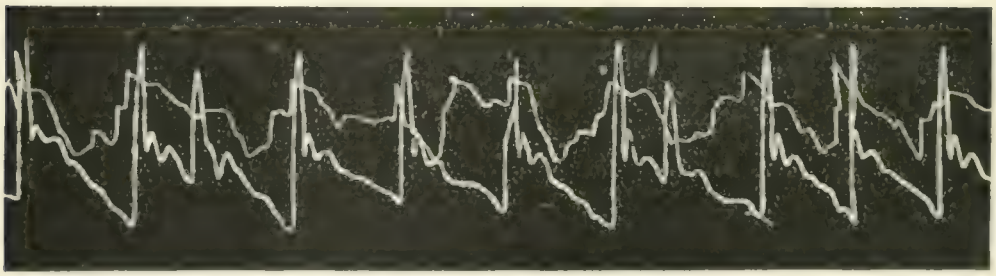

Fig. 12.—Tracing of radial pulse (below) and jugular pulse (above) in adherent pericardium. The second and third, as well as the seventh and eighth radial pulsations are grouped in pairs, the second pulse of each pair having no auricular representative.

With regard to the cerebral manifestations accompanying many of these cases, especially those in which there is paroxysmal reduction of the rate of pulsation, a few words may be added. The onset of these nervous disturbances is undoubtedly due primarily

[1] *Op. cit.*
[2] *Phil. Trans.*, London, 1892, vol. clxxxiii. p. 199.
[3] "Nervous Affections of the Heart," 1904, p. 83.

to sclerosis of the cerebral vessels, and it is impossible that they can be directly the effect of coronary sclerosis as suggested by Krehl.[1] The tracings published by Webster[2] are in themselves sufficient to disprove the conception of Krehl. In these there are no premature or abortive systoles during the period of cerebral disturbance, and if the condition were due primarily to cardiac causes, these would certainly be seen. The view which has already been suggested by myself[3] is practically that of "intermittent claudication":—"When we analyse the onset of this symptom, we find that the patient has usually been undergoing some stress leading to strain. Sometimes it may be slight intellectual stress, as writing a business letter; at other times physical exertion, such as flying after a tramway car. It seems to me that the probable explanation is this:—In sclerosis of the cerebral vessels, whenever there is any stress put upon the circulation, the blood supply to the brain is inadequate and ineffective. There is, as a result of that deficient supply, a condition of irritable weakness of the inhibitory mechanism; impulses are sent down to the heart; it is inhibited, and the features of the attack are found.

"One interesting point deserving of consideration is the matter urged by Tripier.[4] This author believes that the epileptiform movements precede the infrequency of the pulse, and seems to consider them as the cause of the bradycardia. His views have been stoutly combated by Broadbent,[5] and within the last three years they have received the *coup de grace* at the hands of Webster,[6] whose tracings show clearly that the changes in the action of the heart precede the epileptiform attacks."

Diagnosis.—But little need be said on this aspect of the subject; one or two remarks will be enough. It does not require much care to determine whether in any instance the observer is dealing with a real case of infrequency of heart pulsation, or with one in which the diminished rate of the arterial pulse is caused by missed beats. If the former condition is found to be present, the next stage of the inquiry will be directed to the discovery of the cause which has produced the infrequency of the heart beat. Every possible factor must be passed in review, and from the history of the case, as well as the conditions presented by the patient, a reasonable degree of certainty will be reached.

Prognosis.—A pronounced reduction of pulse rate has from the dawn of medicine been regarded as of serious import. The words of Galen on this subject are most pregnant,[7] and the

[1] Nothnagel's "Specielle Pathologie und Therapie," 1901, Bd. xv. S. 352.
[2] *Op. cit.*, p. 413.
[3] "The Nervous Affections of the Heart," 1904, p. 65.
[4] *Rev. de méd.*, Paris, 1883, p. 1001.
[5] "The Pulse," 1890, p. 120.
[6] *Loc. cit.*
[7] "Περί προγνώσεως σφυγμῶν," βιβ. β. "Galeni Librorum, Pars tertia," 1538, p. 10, and "De præsagatione ex Pulsibus," lib. ii. "Opera omnia," 1542, tomus iv. col. 425.

experience of well-nigh two thousand years has amply confirmed his views. But the outlook in every case must be considered in view of the conditions which it presents, and the exact nature of the factors which have induced it must be carefully ascertained. The nervous causes may be of such a grave character as to bring about a fatal termination, or to produce a permanent change in the action of the heart; the toxic agents, as a rule, either end in a fatal issue or in complete recovery; the circulatory changes are much more likely than any to induce a permanent reduction of the rate of the heart. The remark of Balfour[1] on the subject of senile infrequency of heart beat will be echoed by all who have worked at the subject: "As a rule, the steady, slow, funereal beat never varies from the time it commences till the patient's death."

Therapeutics.—The treatment of cases manifesting the symptom under discussion must of necessity be based upon the determination of the nature of the underlying lesion. In the instances of organic nerve disease, the opportunities of relief always depend upon the possibility of removing the nervous lesion. In those dependent upon reflex causes, treatment directed to the disturbing factor must be adopted, while in those produced by functional disorders the aim of the physician will be to restore the whole nervous system to a more healthy condition.

In the group of cases induced by toxic influences, elimination of the poison is imperatively necessary. As regards the metallic and chemical poisons, the proper remedy for each must be employed, and the element of time is necessary. In the cases produced by microbic poisons there is usually a natural period to the symptoms induced by their noxious influence, and it suffices to support the patient during the interval which must elapse before the poison has been thrown off. For most of these poisons strychnine is more or less an antidote, and it acts most beneficially when given subcutaneously. For the cases in which arterial spasm is responsible, the nitrites must be employed, while in those produced by arterial and cardiac degeneration hydriodic acid and the iodides are of paramount importance. In many of these cases the iodine compound may be employed most usefully along with digitalis or strophanthus. This appears to be in itself somewhat paradoxical, but it is probable that these two last-mentioned drugs operate by increasing the nutrition of the cardiac muscle. One interesting point deserves mention. The use of atropine has sometimes been suggested as a means of bringing the reduction of heart rate to a favourable issue, and it has seemed a method likely to be followed by good results. Undoubtedly, when the change of rate is due to nerve influences acting through the sinus, atropine will be useful. A really valuable observation has lately been published by Erlanger.[2] He points out that the auricular

[1] "The Senile Heart," 1894, p. 102.
[2] *Johns Hopkins Hosp. Bull.*, Baltimore, 1905, vol. xvi. p. 202.

beat is under the influence of atropine, while the ventricular is not. This accords with our knowledge that in cases of heart block atropine is useless. It also falls well in with the experience of Dehio,[1] who found atropine very useful in the infrequent heart rate of sinus thrombosis, but of no avail in that of convalescence from acute disease.

In every form of reduced heart rate the dietary must be so arranged as to give the least possible disturbance to the digestive system. A sufficiency of rest must be allowed for the purpose of aiding nature in restoring cardiac energy, while enough of exercise must be obtained to keep up tissue change. It is in this way that massage is of so much importance. If the patient is not in a condition to indulge in active exercise sufficient for the purpose, the passive exercise furnished by massage will come to his aid. The assisted exercises of the Swedish school are most helpful, and particularly those forms which induce deep respiration.

For much help in this contribution I wish to express my warm thanks to Dr. Oliphant Nicholson and Dr. W. T. Ritchie, as well as to my House Physicians, Dr. D. Halliday Croom, Dr. R. W. Johnstone, and Dr. H. A. Stewart.

Postscript.—It may be added that the term bradycardia, like tachycardia, is a very bad one. The early Greek writers employed the word βραδύς in the sense of the Latin *tardus*, meaning of any action that it took place *slowly*, while they used the phrase ταχύς as the equivalent of *celer*, implying that any event occurred *quickly*. The real term for a pulse which has a low rate is ἀραιός, equal to *rarus* or *infrequens;* for a pulse of high rate the classical name is πυκνός, which is the equivalent of *creber* or *frequens*. In our own language we have the same confusion, slow and quick being very often used in a totally wrong sense. The term bradycardia seems to have been first employed by Grob,[2] and that of tachycardia by Gerhardt.[3] The consideration of such medical terms inevitably recalls the remark of Anatole France:[4] "Ces maux, effroi de l'homme, ont des noms, effroi du philologue."

[1] *Deutsches Arch. f. klin. Med.*, Leipzig, 1894, Bd. lii. S. 74; and *St. Petersb. med. Wchnschr.*, 1902, S. 1.

[2] *Op. cit.*

[3] *Samml. klin. Vortr.*, Leipzig, 1881, No. 209, S. 1861.

[4] "Le Crime de Sylvestre Bonnard," 1881, p. 264.

SUDDEN AND SIMULTANEOUS ONSET OF CEPHALIC BRUIT AND DEAFNESS.

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The case I am about to relate is extremely interesting, and, I think, in several respects stands absolutely by itself. This, of course, may be a rash statement, as it is not possible to be certain that no similar instance has been recorded; but from my researches in current literature I have been driven to the above conclusion.

The patient—a cultured clergyman, æt. 57—consulted me in November 1897.

The chief complaint at the time of visit was of deafness and buzzing in the right ear. In February, on a Monday morning, he had an attack of sudden pain in the head, noises in the right ear, followed by sickness. Giddiness was not complained of, but the patient stated that he could not raise his head. There was no rise of temperature. On the following day he was much better, and able to dictate two letters. The noise and deafness in the right ear continued. Previously he heard well in both ears. On testing, I found that on the right side the patient could not hear a watch tick, and that in all probability there was absolute deafness for the voice, *i.e.* the patient could only hear a loud voice near the ear, and this was perceived whether the other ear was open or stopped. The tuning-fork applied to the middle line gave an uncertain result, but it was better heard from the right than from the left mastoid. I may mention that all through bone conduction seemed to be retained on the affected side. On further examination, the right tympanic membrane was seen to be a little indrawn, while rhinoscopy revealed that both posterior and anterior nares were practically normal. On introducing an auscultating tube into the meatus, I was somewhat astonished to hear a buzzing systolic bruit, which stopped on compression of the carotid. No pulsation was visible, but the sound was heard by placing a stethoscope around the ear, being detectable above the auricle, but on this occasion most intense over the lower part of the mastoid. The intensity of the sound seemed to vary from time to time, and even from minute to minute. Rest and iodide of potassium was ordered. At an examination a few days later, I have noted that the bruit was like the interrupted purring of a kitten. Heart sounds were normal, and pulses equal, while there was no detectable anomaly in the vessels around the ear. After this visit I asked the patient to see Professor Wyllie, with a view to examination of his general and local state, and more particularly to ascertain the condition of the discs. Nothing abnormal was detected, and Professor Wyllie was inclined to agree with my suggestion of intracranial aneurysm.

Nearly two years later I again saw the patient (June 1899). He had never had a repetition of his first attack, but still heard a sound in his right ear. On auscultation now nothing could be heard, and he expressed himself as feeling well. Hearing was as before, with good bone conduction on right side. During this visit, after the patient had changed from one chair to another, the noise came back, and was audible both through auscultating tube and stethoscope. In February of 1900 I saw him again, and he told me that after the least excitement he felt a fulness of the head. The bruit was audible, and I again strongly urged him to give up work. In 1901 things were as before, excepting that Mr. X. occasionally felt giddy on stooping. On 10th and 11th February 1902 I again examined, and there was then no murmur to be heard either by tube or stethoscope, no matter whether the patient was sitting, stooping, or standing. In 1904 the bruit was audible only when the patient rose suddenly from a chair. My last examination was on the 6th March of this year. Mr. X. was feeling well—had occasionally heard booming. No bruit was heard while sitting, but became detectable on rising. It seemed to cease on full inspiration.

So far as I can gather, the question of objective tinnitus has been neglected by modern writers, and even in works on intracranial aneurysms which may rightly be deemed classical, the existence of audible murmurs is not more than touched upon. Thus Gowers[1] writes: "A murmur, the most common symptom of aneurysms elsewhere, is very seldom produced by those within the skull. In a few recorded cases of aneurysm of the internal carotid, not only has the patient been conscious of a murmur, but this has been distinctly audible on auscultation of the skull, and has been arrested by pressure on the carotid. In one case of aneurysm of the left vertebral artery, beside the medulla oblongata, a loud murmur could be heard on each side between the mastoid process and the spinal column." Again:[2] "A sound produced in an intracranial aneurysm (of internal carotid or vertebral) may be heard by another person on listening through a stethoscope applied to the skull. In extremely rare cases, sounds, apparently of intracranial origin, have also been audible on auscultation, as in the case of a boy 8 years of age (observed by Greene), in whom an aneurysm was most unlikely. In another case a pulsating sound, resulting from some effect of a blow two weeks before, could be heard 8 in. from the patient."

This last-named case was recorded by Poorten of Riga,[3] but Gowers omits to mention that it was eventually associated with exophthalmos. Pulsating exophthalmos is a condition known to oculists, and has been found to depend upon injury or disease producing aneurysm of the ophthalmic artery, aneurysm by anastomosis between the carotid artery and cavernous sinus and thrombus of the latter. At least one case has, however, been

[1] "Diseases of the Nervous System," vol. ii. p. 533.
[2] *Ibid.*, p. 273.
[3] *Monatschr. f. Ohrenh.*, Berlin, 1878, No. 4.

recorded in which vasomotor paralysis of the orbital vessels was assumed (von Sattler).[1] In these cases cephalic murmurs are heard, which are usually loudest in the neighbourhood of the orbit. In 1854, Rayer[2] recorded a case of unilateral pulsating tinnitus audible to the auscultator which temporarily ceased on compression of the posterior auricular artery. No aneurysm or heart disease was present. Richardson[3] described several cases of bruit in the neighbourhood of the ear, in which tinnitus was a marked symptom, and yet no aneurysm existed, and a similar instance has been recorded by Fitzgerald.[4] In some of these cases the murmurs entirely disappeared, and we are driven to consider them as functional: or perhaps it would be more accurate to write that we conceal our ignorance by the term. However that may be, we find that more modern investigations and records concerning bruits in the neighbourhood of the ear are extremely scanty. Thus, if we take the article by Kiesselbach[5] on vascular murmurs (*Gefässgeräusche*), we find nothing calculated to throw light upon this somewhat obscure subject. He quotes an observation of Moos, where post-mortem examination seemed to show that a bruit was due to dilatation of the jugular bulb, but he fails to mention that the appearance presented was believed by Rüdinger the anatomist to be common: and he further states that Boudet had observed propagation of a venous hum towards the ear in anæmia.

In this connection, physicians will no doubt recall the observations of Tripier on the cephalic murmur of anæmia,[6] associated with which tinnitus was often noted by the patients. Politzer[7] deals very shortly with the question of vascular murmurs as a cause of tinnitus, and dismisses the subject with a brief mention of one or two recorded cases.

In 1903, Zur-Mühlen[8] described two cases of aneurysm of the internal carotid. The first was that of a woman of 57, in whom a cephalic bruit followed an injury, but as the patient remained alive and well with all her senses preserved, this diagnosis seems very doubtful. The author has ignored the fact that such murmurs may exist and afterwards disappear without leaving any bad symptom. His second case was obviously one of communication between the carotid artery and cavernous sinus, giving rise to disturbance of the visual field and exophthalmos. In this instance great improvement followed ligature of the common carotid. It will be seen that while I have endeavoured to collect modern

[1] "Handbuch der Gesammten Augenheilkunde."
[2] Von Tröltsch, "Lehrbuch der Ohrenheilkunde."
[3] *Med. Times and Gaz.*, London, 1868, p. 142.
[4] *Trans. Internat. Med. Congr.*, 1881.
[5] "Encycl. der Ohrenheilkunde," 1900.
[6] *Rev. de med.*, Paris, 1881.
[7] "Lehrbuch der Ohrenheilkunde, 1901, S. 633.
[8] *Ztschr. f. Ohrenheilkunde*, 1903, Bd. xlv. S. 57.

literature on cephalic murmurs I have not been successful in my search. As a last resource I turned to the most recent large work on diseases of the nervous system (Oppenheim [1]), and have extracted from this the points which seem to bear upon the matter in hand.

"Aneurysm may run its course without symptoms up to the moment of rupture. . . . Generally, however, an aneurysm manifests itself by cerebral symptoms, both general and local. To the first category belong headache, which is sometimes described as pulsating, and sometimes takes the form of hemicrania (Fiedler, Karplus . . .), vertigo, vomiting, stupor, which may occur in large aneurysms, and convulsions, which are not frequent. These symptoms are common to aneurysms and other conditions which cause intracranial pressure. Choked disc is usually absent; still, after rupture, blood may find its way along the sheath of the optic nerve and show itself on ophthalmoscopic examination. Particularly characteristic is a pulsating bruit which is audible over the whole skull or at a special spot. Sometimes this can be perceived at a distance. Certainly, however, this is by no means pathognomonic of aneurysm, as it may occur in tumours, which, owing to proximity to a large vessel, compress it (Hennig, Jurasz, Oppenheim, Bruns), and in vascular growths. In childhood particularly these murmurs have no pathognomonic value, as they occur in healthy children, in rickets, anæmia, and vasomotor changes, a fact of which I have been able to convince myself in the case of women. An observation by A. Fuchs teaches that idiopathic hydrocephalus of adults may also cause this symptom. Perhaps congenital narrowing of the carotid foramen may also be a cause (*Tröltsch Urbantschitsch*). A few times cephalic murmurs have been perceived in Graves' disease, pulsating exophthalmos, and pressure of tumours on the sympathetic (Gowers). D'Allocco, on the strength of this symptom, diagnosed an aneuryism while there was in reality only an atheromatous condition of the cerebral arteries. A similar state of matters occurred in a case described by Wallenberg. Through pressure on the cervical carotid, a murmur due to the internal carotid or its branches can usually be stopped."

Oppenheim then goes on to discuss very briefly the various local symptoms which may be produced by aneurysms, but fails to refer to deafness. This question, however, we find very fully and critically discussed by Lebert.[2]

"Of the greatest interest are disorders of hearing, but we cannot always ascertain in what proportion they are due to changes in the auditory nerve itself or its nucleus, and to what extent the internal auditory artery, which is for the most part hidden from ordinary observation by becoming obliterated, contributes to the

[1] "Lehrbuch der Nervenkrankheiten," 1905.
[2] *Berl. klin. Wchnschr.*, 1866, S. 347.

result. Tinnitus, impairment of hearing, partial deafness on one side, becoming complete, and at the later stage bilateral, or even bilateral from the beginning, are the symptoms which have been observed. The observations are unfortunately not always complete, *i.e.* deafness and unilateral deafness are not sufficiently differentiated—which is surely an important point. These phenomena are rare where the carotid system is involved. Only once did deafness occur in an aneurysm of the posterior communicating artery; once there was deafness and tinnitus in aneurysm of the anterior cerebral. Where the middle cerebral was involved tinnitus was frequently observed, but without deafness. On the other hand, there was present in no less than six cases of aneurysm of the basilar artery, deafness which came on rapidly and was accompanied by tinnitus. As a large number of these cases only came under observation after an apoplectic seizure had occurred, it is fair to assume that auditory phenomena occur even oftener. Disturbance of hearing may then, under some circumstances, become an important element in the diagnosis of basilar aneurysm. In one case of aneurysm of the posterior cerebral, impairment of hearing occurred towards the end, and in one of the inferior cerebellar, left-sided deafness had developed, so that aneurysms of other vessels than the basilar may, if more rarely, cause this symptom."

I have thus endeavoured to place before the reader such general facts as seem to me to bear upon cephalic bruits. Before passing to a critical review of the symptoms of my own patient, I should like to give the history of an unpublished case which Professor Wyllie has kindly placed at my disposal, and which I had the privilege of examining with him years ago.

A boy of 8 was admitted to Professor Wyllie's ward under the following circumstances in January 1885. In the previous September the patient was sliding down a balustrade, when he fell 8 ft. on to a stone floor, landing on the left side of his head. He was unconscious for five hours. The first thing he noticed after recovering his senses was singing in the ears. He remained in bed for three weeks, had his head shaved, and ice applied. A month after the accident he returned to school, and attended for three weeks. The noise in the head, however, troubled him so much that he had to leave. He was then seen by his doctor, who advised removal to the infirmary. According to the history, there was, after the accident, great swelling, but no bleeding. When in bed for the first three weeks, he had a good deal of pain, which was relieved by ice. Later, when he was able to get up, this symptom was less persistent, and only troubled him on first getting out of bed. In the morning, too, tinnitus was more intense than at any other time of day; but at midday, when he hurried home for dinner, it became well marked. When this record was taken, he had had no pain since the 15th (December 1884?), when he had a great feeling of sickness and aggravation of the pain, which was relieved by a cold bandage. At that time he was also suffering from a sore throat. The pain was at

one time "stunning," at another time "burning." He described the sound as varying greatly from time to time, at times being like the hum of a threshing machine, and again there was occasionally a squeaking which he likened to mice. Then, again, occasionally it resembled the sound of a sea-shell. The singing was much aggravated when he ran, closed his glottis, or strained in any way. Since the accident, he stated that his eyes had troubled him. He could not read at night, and looking at a bright light gave him pain. When he read his sight became dim and his eyes sore.

His past history was good — measles was the only illness he suffered from; his father, mother, and six brothers and sisters were all strong. His home was comfortable. The patient's conformation was good; rather small (4 ft. 2 in.); weight (4 st. 4½ lb.); muscularity good; aspect serious; expression cheerful; temperature, 96°·8–98°.

The systems were all normal, with the following exceptions. General circulation was also normal excepting in head, where on the left side there was heard with the stethoscope a loud whistling bruit. It was very like the arterial anæmic bruit, "but the whistle was more highly pitched, and there was far more energy about the whole bruit." It was especially increased by exercise, or when he strained; the whistle then became like that of a distant railway engine. It was stopped on compression of the carotid. The greatest intensity of the bruit was in the vertical line of external auditory meatus and about 3½ in. above it. The further away from this point the stethoscope was placed, the more faintly was the murmur heard, but it could be perceived over the whole head.

Examination of the eyes gave the following results. Marked degree of hypermetropia, especially in left eye. Veins full in both eyes, but distension not beyond the limits of health. Writing from memory, there was nothing abnormal in the ears. No special treatment was employed, except that he was ordered to lead a quiet life, not to return to school at first, and when he did, to have short hours. He learned to compress the carotid and thus temporarily stop the noise.

In July 1887 (two years and four months after the period covered by the above notes terminated) he reported himself. He stated that he had still occasional headaches, often brought on by exertion. Bruit had then been quite away for five months.

This case of Professor Wyllie's, interesting and obscure as it must remain in respect to detail, is relatively easily explained. Obviously the injury involved a vessel, possibly the internal carotid in its passage through the temporal bone, and gradually with growth and lapse of time the obstruction to circulation disappeared without producing any permanent injury.

My own case, however, must, I think, remain more or less of a clinical puzzle. A hale man in perfect health, with no history of injury or recent disease, was suddenly attacked by pain in the head, and noises in the right ear, followed by sickness. Giddiness seems not to have been present in the true sense of the term, and certainly did not last for any time. So far the case resembles what is known as Menière's disease, but without giddiness. A peculiar feature was that hearing for the tuning-fork by bone

conduction seemed to be preserved notwithstanding the absolute deafness for external sounds. In spite of this, however, I think that no one will question that the lesion causing the deafness must have occurred in the labyrinth. Moreover, the absence of any pronounced vertigo would lead to the belief that the semicircular canals had to a great extent or completely escaped. The most probable diagnosis at first was to my mind an embolism involving that branch of the internal auditory artery which supplies the cochlea. I have only been able to find one authenticated case of embolism of the internal auditory artery on record. Gruber[1] refers to an example of it described by Friedrich. In this instance, however, the lesion was due to endocarditis. Now, in my own case I think that we must connect the cephalic bruit with the deafness. Moreover, from the history we must assume that this cephalic bruit began as suddenly as did the other symptoms, namely, on a Monday in February. The murmur was so loud that the patient could not have failed to notice it had it been present before. In trying to find an explanation, we are almost driven to assume a sudden aneurysmal dilatation of one of the intracranial vessels. As, apart from headache and fulness, there were, after recovery from the acute attack, no symptoms, it seems useless to try to localise the affected vessel. That it belonged to the carotid system, however, seems certain, as the bruit was stopped by pressure on the common carotid in the neck. Here we are confronted by a difficulty, in that the internal ear blood supply is generally assumed to be by way of the vertebral arteries, although the internal auditory may arise from the basilar.[2]

That the sudden deafness in this case can at first sight be best explained by the hypothesis of an embolism, seems to me clear; yet it is equally obvious that more or less grave objections exist to this assumption. An alternative explanation would be found in the suggestion that a sudden lesion resulting in dilatation of a large vessel occurred, and that the circulation was thus profoundly altered in the cochlea. Failing these two propositions, we should have to consider the cephalic bruit and the deafness as merely coincident, and as not bearing to one another any causal relation—a theory too improbable to be tenable.

Even if there was not the anatomical difficulty as to embolism, it would still be very remarkable that immediately on the occurrence of the lesion of a large vessel the internal auditory artery should become blocked. It is, I think, hardly conceivable that the cephalic bruit could have existed previous to the date of the acute seizure, as the patient would then have certainly noticed it. For this reason, after my careful consideration, I am rather inclined to the view that the sudden occurrence of an aneurysmal dilatation of a large vessel so modified the circulation in the right cochlea as to do it irreparable injury.

[1] "Lehrbuch der Ohrenheilkunde."

[2] Oppenheim, *op. cit.*, p. 679.

A CASE OF MALIGNANT PULMONARY ENDARTERITIS AFTER GONORRHŒA, SIMULATING DISEASE OF THE PULMONARY VALVE. WITH A NOTE ON THE CARDIAC COMPLICATIONS OF GONORRHŒA.

By Karl Fürth, M.D., and F. Parkes Weber, M.D., *Physicians to the German Hospital, Dalston, London.*

Case.—Markus B., æt. 27, a clerk, native of Vienna, was admitted to the German Hospital 21st May 1901, and was there under Dr. Fürth's care, and for a time under Dr. Weber's care during the former's absence.

The patient had only been a few months in London, where his means of living had been much restricted. His family history was good, and, with the exception of measles and sore throat, he could remember no early diseases. Two years ago he contracted gonorrhœa, from which he recovered in a few weeks. He again suffered from gonorrhœa in January 1901, and quite suddenly, about two weeks before admission, the urethral discharge ceased, and the symptoms commenced for which he came to the hospital, namely, rigors, which recurred once every day, together with headache, etc.

Condition on Admission, *May* 1901.—The patient was a strongly-built, pale-looking man.

Heart.—Not enlarged. The apex beat in the fifth intercostal space in normal position. The heart sounds at the apex natural. To the left of the sternum, in the second intercostal space, in addition to the first and second sounds, there was a rough systolic and diastolic double murmur, which at first made Dr. Fürth think of pericarditis. This murmur was heard more distinctly on pressure with the stethoscope, and was limited to an area of about the size of a five-shilling piece. It was not conveyed into the vessels of the neck, and there was no "carotid throb." The lungs appeared healthy, and by palpation nothing abnormal was found in the abdominal organs. *Urine.*—Specific gravity, 1012; neutral reaction; albumin present; sugar absent; diazo reaction negative. There were urethral threads in the urine, and by microscopic examination a few white cells and granular casts were seen. No gonococci could be found in the urethral threads. The blood showed 100 per cent. hæmoglobin-value, and a slight leucocytosis.

During the seven months between the patient's admission and his death (18th December 1901), the illness did not much vary in its main features, though the feebleness gradually increased. The fever was almost always of an irregular intermittent type, with rigors. At first the daily rise occurred fairly regularly at almost the same time every day, so that the temperature chart suggested a quotidian malaria. Afterwards these fever paroxysms occurred less regularly, and typical rigors less often. Quinine, antipyrin, pyramidon, and other antipyretic drugs had little effect, either on the fever or on the subjective symptoms. From the 7th to the 22nd of August, a period during which no antipyretic drugs were being used, the temperature remained almost normal, and during that time the patient felt free from the subjective symptoms

which accompanied the sharp rises of temperature, but he still complained of an abnormal cardiac sensation of some kind. This remarkable interval of apparent improvement was followed by a type of fever with daily intermissions, which continued till a week before his death, when the temperature became subnormal. Fig. 1 is a temperature

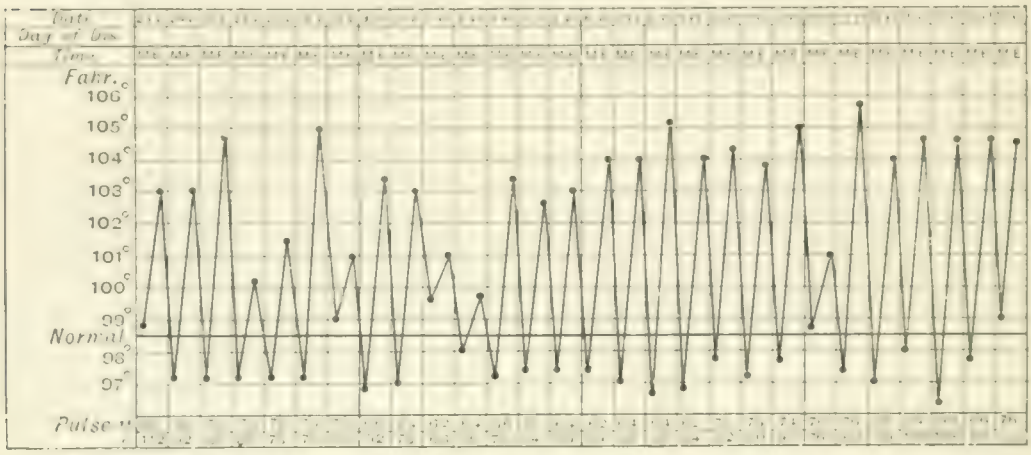

Fig. 1.

chart showing the highest and lowest temperatures every day for the first four weeks, and it may be noted that just during this period the patient was receiving considerable doses of quinine and salipyrin. Fig. 2 shows the four-hourly temperature chart from 8 A.M. to 6 P.M. for a week in September.

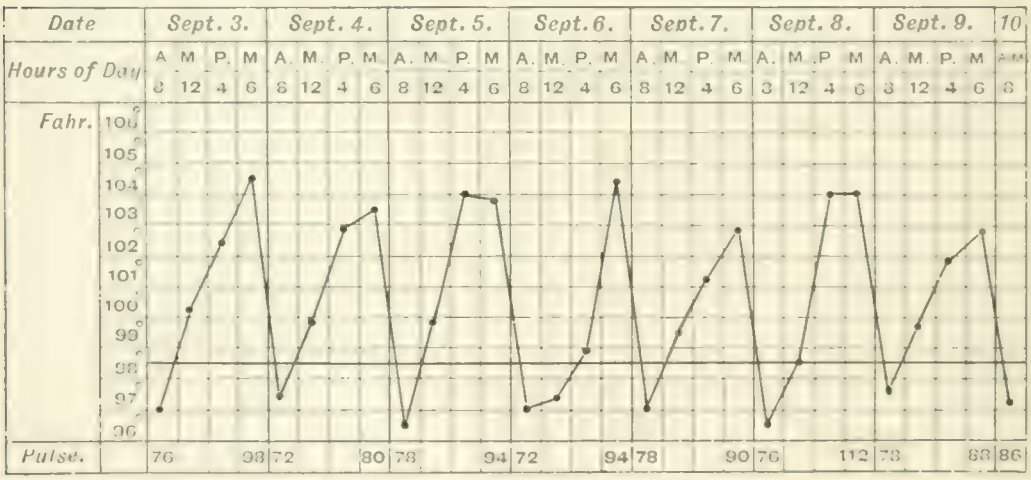

Fig. 2.

The pulse frequency was generally 70 to 90 per minute, and even when the fever reached its height it was seldom more than 100 per minute. It was always regular, at first full and strong, afterwards dicrotic, never having the typical jerky and collapsing character of aortic regurgitation.

On the 8th of August the cardiac apex beat was still in the fifth intercostal space, just inside the nipple line. The dulness commenced above at the third rib, and did not then extend to the right of the

sternum. To the left of the sternum, in the second interspace, over an area about the size of a penny, a long, loud diastolic murmur was heard, extending from the second sound to the first sound, which over this area was not quite pure. No other cardiac murmur was present. On the same afternoon the radial pulse was 74 per minute, regular, of medium size and tension, with rather sudden rise, but not collapsing, as in cases of aortic regurgitation.

In September, examination of the heart showed, besides the murmur already alluded to as accompanying the pulmonary first sound, the same remarkable localised long, rolling, or mill-like diastolic murmur, having its maximum intensity in the second left intercostal space, about an inch to the left of the sternum. The murmur was heard loudest during the pause between the end of inspiration and the commencement of expiration, and during the first part of expiration. It started immediately after, or "ran off from," the second pulmonary sound, which could be distinctly heard. Both sounds could be heard over the aortic area. There was complete absence of the "carotid throb," a sign on which Broadbent has laid much stress in distinguishing pulmonary from aortic valve disease. During the last third of the illness the cardiac dulness was considerably increased to the right, and to some extent also to the left.

The spleen was found to be enlarged after the 1st of June. From June to August there were repeated symptoms of pulmonary embolism (sudden dyspnœa and sanguineous expectoration, together with dulness and bronchial breathing over a limited area of the lungs). The urine showed about half per mille albumin at the commencement, but later on was occasionally free. During the last third of the illness, however, the amount of albumin was greater, and there were hyaline casts and a few white corpuscles. A positive diazo reaction was never obtained. After November there was ascites and œdema, and at the end there was a good deal of diarrhœa. A few weeks before death cutaneous petechiæ were observed, but no retinal hæmorrhages were found by ophthalmoscopic examination.

When the periods of fever were at their height, the patient complained a good deal, especially of sharp pains in his knees, but during the rest of the time his subjective condition was remarkably good, and he had not the feeling of suffering from a grave disease. Many antipyretic drugs were used, as we have already stated, but with little if any effect. For about fourteen days inunction with unguentum collargol Credé was tried, but with no apparent result. Treatment by injections of antistreptococcic serum was refused by the patient. At the end opium and tannalbin were of some use for the attacks of diarrhœa.

Necropsy.—(*December* 19, 1901).—The heart weighed 15 oz., and showed some hypertrophy of both ventricles, and dilatation, especially of the right ventricle. The circumference of the pulmonary orifice at the level of the valves measured $4\frac{1}{8}$ inches. In both right and left ventricles there were old and recent thrombi. None of the cardiac valves were diseased, but on the anterior wall of the pulmonary artery, about $\frac{3}{4}$ in. beyond the pulmonary valve, was a rough warty outgrowth, somewhat oval in shape, about 1 in. across in its longest diameter, and projecting about $\frac{1}{8}$ in. from the inner surface of the artery. For the photograph to

show this (Fig. 3) we are indebted to Dr. Bloch, then acting as house-physician. Macroscopically and microscopically, this outgrowth appeared to be similar in structure to vegetations on the valves in cases of malignant endocarditis. It consisted of a more or less organised portion adjoining the arterial wall, covered with a fibrinous layer projecting into the vascular channel; and with appropriate stains it showed masses of cocci, some of them arranged in definite streptococcal chains, chiefly situated between the organised and fibrinous portions. No typical gonococci could be detected.

FIG. 3.

The lungs were both scarred from embolic infarctions, but there were no quite recent infarcts. Dense bands of fibrous tissue bound down the depressed scars in the lungs to the chest walls.

The spleen was very much enlarged, weighing 41 oz., and measuring 9 in. by 4½ in. There was a moderately large anæmic infarction. The substance of the organ was rather firm, and iodine solution poured on its cut surface gave the typical reaction for amyloid change.

The liver was much enlarged, weighing 82 oz., and the kidneys, which were likewise enlarged, weighing together 21 oz., contained several infarcts of different sizes. Both liver and kidneys, like the spleen, gave a positive reaction with iodine for amyloid change. Microscopical sections of a fairly recent renal infarct showed the presence of streptococci, just as the vegetation in the pulmonary artery did.

In the consideration of our case, the first question which arises is that as to the relationship between the disease of the pulmonary artery and the patient's previous gonorrhœa. The local presence of gonococci has been proved in various cases of tenosynovitis, arthritis, pleuritis, peritonitis, and inflammations of muscular and subcutaneous tissues accompanying gonorrhœa. Since Leyden's[1] publication in 1893, quite a series of cases of malignant endocarditis have been described, in which gonococci were microscopically detected in the vegetations on the cardiac valves.[2] In 1897, Lenhartz[3] was able to prove the existence of a direct causal relationship between the gonococcal urethritis and the cardiac lesion in a case of malignant endocarditis following gonorrhœa.

[1] *Deutsche med. Wchnschr.*, Leipzig, 1893, No. 38, S. 909.

[2] In a case under Dr. Port's care at the German Hospital in 1896, of malignant endocarditis of the aortic valves following gonorrhœa, there were diplococci (gonococci ?) to be seen in the microscopic section of a splenic infarct.

[3] *München. med. Wchnschr.*, 1897, S. 1337.

He obtained a pure culture of gonococci from a vegetation on the pulmonary valve, and by inoculation with this culture he produced a typical attack of gonorrhœa in a man. Councilman[1] demonstrated the local presence of gonococci in a case of myocarditis and pericarditis (without endocarditis) following gonorrhœa. Gonococci have likewise been detected in the blood in several cases of malignant endocarditis and pericarditis, notably recently by P. Krause,[2] Frendel,[3] and Rye.[4]

We have, however, to distinguish cases of gonorrhœal, though not gonococcal, endocarditis, pericarditis, etc., from the cases in which the local presence of gonococci in the lesions can be demonstrated. Lenhartz himself mentions a case of endocarditis, due to streptococci, and another one due to staphylococci, occurring in patients with gonorrhœa (it is important to note that in both these cases the endocarditis followed dilatation of the urethra for therapeutic purposes), and Keller[5] and Heller[6] have described similar cases, in all of which the endocarditis, though not due to the local presence of gonococci, might be termed gonorrhœal, inasmuch as the gonococcal affection of the urethra made it possible, or prepared the way, for the local and general invasion by the pyogenic microbes which set up the endocarditis. In the same way, doubtless, in our case the disease of the pulmonary artery may be termed gonorrhœal, though it was not gonococcal.

We now come to the remarkable localisation of the lesion in the pulmonary artery. Many cases of malignant endocarditis of the valves have been described, but no case has yet been recorded in which the site of the malignant inflammation was the wall of the pulmonary artery, quite beyond the valves. Somewhat analogous cases of malignant endarteritis of the aorta have, however, been observed. His[7] described a case in which aortitis occurred after gonorrhœa, and produced a localised aneurysm, with warty vegetations, at the commencement of the aorta.

In our case the position of the disease, close to the bifurcation of the pulmonary artery, suggests that the great friction and impact at this situation had something to do with the localisation of the lesion.

The symptoms, although at first suggestive of commencing pericarditis,[8] soon appeared to point to disease of the pulmonary valve.

[1] *Amer. Journ. Med. Sc.*, Phila., Sept. 1893.
[2] *Berl. klin. Wchnschr.*, 1904, No. 19.
[3] *Wien. klin. Wchnschr.*, 1903, No. 27.
[4] *Deutsche. med. Wchnschr.*, Leipzig, 1903, S. 412.
[5] *Deutsches Arch. f. klin. Med.*, Leipzig, 1896, Bd. lvii. S. 386.
[6] *München. med. Wchnschr.*, 1903, S. 1050.
[7] Quoted by Dauber and Borst, *Deutsches Arch. f. klin. Med.*, Leipzig, 1896, Bd. lvi. S. 231.
[8] Shortly before this case, Dr. Fürth had a woman, æt. 33, under his care in the hospital with pericarditis and an intermittent type of fever accompanying gonorrhœa. She gradually recovered in eight months, excepting for a liability to tachycardia on any exertion. It may be noted that in this woman the pericarditis developed in spite of the fact that she had been kept at rest for four weeks.

The position of the diastolic murmur, and the absence of all signs of disease of the aortic valves, made us feel certain of the presence of incompetence of the pulmonary valve. The repeated rigors seemed also to make it clear that the disease was one of malignant and not of benign endocarditis, and this fitted in well with the known fact, that in almost every case in which the pulmonary valves have been rendered insufficient by organic disease, the cause of the valve disease has been malignant endocarditis.

The question now arises—Did the lesion in the pulmonary artery in some way produce the long diastolic murmur which led us to diagnose malignant endocarditis with incompetence of the pulmonary valve, or did this lesion only produce the systolic murmur, and was the diastolic murmur really the result of insufficiency of the valve, due to the dilatation of the pulmonary orifice? This dilatation of the pulmonary orifice might account for the murmur at the later stage of the illness, but would not explain its presence earlier, when the patient was first admitted. In fact, we cannot altogether explain the murmur, though we have succeeded in finding the record of an apparently analogous case, in which the aorta was diseased. Aufrecht[1] diagnosed incompetence of the aortic valves in a case in which, after death, the aortic valves were found healthy, though there was a growth of sclerotic tissue in the aorta beyond the valves.

In regard to the treatment of malignant endocarditis by collargol inunctions, it may be noted that G. Coulon[2] claims a success by this method in a case of gonorrhœal endocarditis of the mitral orifice. It seems to us, however, quite doubtful whether the relatively favourable result in his case was really due to the collargol or not. Thayer and Lazear,[3] from their careful study of the cardiac complications of gonorrhœa, conclude that the endocarditis which occasionally complicates gonorrhœa may either be "transient, disappearing with but few apparent results, or it may leave the patient with a chronic valvular lesion, or it may pursue a rapidly fatal course." Coulon's patient recovered, except for a chronic mitral valve defect; but it is certainly not clear that the recovery was due to collargol.

[1] Quoted in the "Twentieth Century Practice of Medicine."
[2] *Arch. gén. de méd.*, Paris, 1904, July 12, p. 1758.
[3] *Journ. Exper. Med.*, New York, 1899, vol. iv. pp. 81–103.

HAS OBSTETRIC PRACTICE IMPROVED WITHIN THE LAST TWENTY-FIVE YEARS?[1]

By F. W. N. Haultain, M.D., F.R.C.P.Ed., *Physician, Maternity Hospital; Gynæcologist, Deaconess Hospital, Edinburgh.*

Within recent date there have been a number of papers published bearing on the question of puerperal septicæmia, and all with one accord are loud in proclaiming the serious impeachment that this dread complication of labour is as rampant as before the days of Listerism, and many aspersions have been thrown on the medical practitioner and obstetric teacher in consequence. Comparisons (of a most odious nature) have also been drawn, in regard to the advance of obstetrics as compared with the sister branches of medicine. It seems, therefore, in accepting the great honour you have done me by asking me to deliver an address before the Fifeshire Medical Association, that it might be well to sift these statements which have been made, and consider if these accusations are warranted.

It has been shown by Cullingworth and Dakin that, according to registrars' statistics, the percentage of deaths from puerperal septicæmia in practice has not diminished within the last twenty-five years, and this in spite of the marked strides made in the prevention of infection by antisepsis and asepsis.

Curiously enough, this period coincides exactly with my own medical career, and I am therefore perhaps more able, by practical experience, to consider the question from its various aspects. If these statistics are reliable, one must at once admit that Listerism in obstetrics is a snare and a delusion, a source of expense and unnecessary trouble, and should at once be relegated to the region of the past. No other logical conclusion can be come to, for if it be true, the large army of antiseptic and aseptic accoucheurs, in spite of their most urgent efforts, have failed to diminish one iota this terrible scourge amongst our women. Surely a flaw must be found somewhere!

It has been proved without doubt that by the adoption of Listerian methods the previous large mortality from sepsis in our well-equipped maternity hospitals has greatly diminished, a fact which in itself proves that these methods are of the very greatest value. How then can we reconcile these divergent results if one appreciates the ever-increasing number of Listerian disciples. Are antiseptics in a hospital different from those in a private house? The solution of the difficulty may be said to entirely rest on two explanations—

(1) The readier recognition of the complication in its varying manifestations.

[1] An Address delivered before the Fifeshire Medical Association.

(2) The compulsory notification of its existence.

When these two factors are taken into account, it must be admitted that an enormously larger number of cases come under the notice of the registrar than previously did.

The comparison of statistics are therefore impossible, and invidious to dilate upon. From accurate knowledge of the vagaries of infection, cases previously returned as milk fever, peritonitis, shock, etc., have now their true cause assigned to them, and naturally the registrars' list of septicæmia has correspondingly increased.

I would not for a moment suggest that the practice of midwifery throughout is by any means perfect, and that a 1·7 per 1000 mortality represents an irreducible minimum, but one feels certain that the vast majority of conscientious well-trained obstetricians conduct their cases in as aseptic a manner as circumstances will permit of—very different from twenty-five years ago.

To the average practitioner a death from puerperal fever is a calamity which he can ill suffer, not only for the keen mental distress which it must cause him, but also from the more worldly aspect of the depreciation of his success. And in these times of hard and fierce competition the latter alone is sufficient to stimulate him to adopt all precautions—looking at it from the most sordid point of view. When one considers the enormous number of women who are attended by unskilled assistants and by inferiorly educated midwives, also by those untrained, or disbelievers, in antiseptic methods, the present mortality cannot be considered a large one, when it is appreciated that pathogenic organisms are frequently found in the genital canal, and are always rampant at its orifice. It is indeed surprising that infection after labour is not more common, and to the germicidal qualities of the natural genital secretions must the greatest credit be given. The recognition of these qualities of the vaginal and uterine secretions has in later years been mainly instrumental in the abolition of vaginal syringing and douching during and after normal labour.

It is to me an utterly Utopian statement that every case of puerperal septicæmia is preventable: doubtless it is a high ideal to set before one, but to the experienced practical mind quite outside the wildest dreams of fancy.

In this connection a practical question of much interest and importance asserts itself, namely, What is notifiable puerperal fever? This must naturally form an extremely awkward question for the general practitioner to decide, when the condition is branded with this stigma of preventability, and he necessarily will wait, Micawber-like, on the chance of something else turning up to account for the symptoms.

(From the statistics of the Edinburgh Medical Officer of Health during the last two years, there were twenty-three cases of

puerperal fever reported, and twenty-one died,—a cured case of puerperal fever is therefore quite the exception,—and shows a mortality of 90 per cent. In other words, puerperal septicæmia is usually only reported when death results and there is no loophole for escape.)

To arrive at a definite conclusion regarding its presence, the following conditions, it seems to me, would require to be present:—

(1) A continued fever of over 102° F. lasting at least forty-eight hours, with corresponding rise in the pulse rate.

(2) It must occur within fourteen days from premature or full-time confinement.

(3) Local causes must alone account for the constitutional condition.

(4) Which must continue after local treatment has been adopted.

By observing these conditions, one is prevented from notifying slight cases of localised infection, also sapræmic conditions due to toxic absorption, and intercurrent complications associated with continued fever. Even this description is far from complete, for the pyæmic variety, which occurs late in the puerperium, is, in its most virulent form, associated with short and extremely severe feverish symptoms which occur intermittently. Until, however, the Local Government Board can give more definite data to report upon, the above conditions appear to me to be as reliable an index as can be formulated. Should they be adhered to, little criticism can be offered to the conscientious desire of the practitioner.

General.—Should derogatory remarks have been made with regard to our efforts against infection, there can be little cavil at the strides which have been accomplished in the actual practice of obstetrics within the last quarter of a century. All are agreed that not only is the mortality very considerably decreased, but also the morbidity is diminished, with one exception, namely, eclampsia. The treatment of complicated labour has made material advance. This may be said in great part to be due to the free use of the axis-traction forceps, which have reduced a crude method of shortening labour to one of scientific attainment. Its advance has been slow, measured, but sure, and though there are still many imbued with the conservatism of old age or prejudice, there can be no doubt, at least I hope, that the primitive instrument will in due course be relegated to the museums of obstetric teachers as an example of the intermediate stages of advance in obstetric science.

To Tarnier must be given a meed of praise sung by many women and children, little short of that accorded to Simpson for his chloroform or Lister for his antiseptics.

To compare the present perfected axis-traction instrument with its predecessor would be as odious as the speaking tube with wireless telegraphy, or the old "gutty" with the rubber-cored

golf ball. The advantages are so paramount that perhaps it might not be out of place on this occasion to enumerate a few of the benefits of the up-to-date instrument. Irrespective of the minor advantages resulting from increased traction force, lesser tendency to slip, and the guidance to the direction of traction, there are three well-marked benefits which cannot fail to prove the inestimable value of the axis-traction instrument—(1) The ability to pull in the axis of the brim or line of least resistance in "high" forceps cases, which has practically revolutionised the management of labour in justo-minor and flat pelves, and allowed of the delivery of living children through pelves at least a half inch smaller than could possibly previously be done. These cases, however, are comparatively infrequent, and the benefits accruing are infinitesimal as compared with (2) the absence of interference with the normal accommodation of the irregularly shaped passages. In this connection the use of the old instrument might be compared with the brute force tactics of extracting a cork from a bottle—accommodation, in this instance, being a matter of no moment to the thirsty aspirant, even should, in his exertions, the neck be destroyed. With the more modern instrument the fine and delicate movements of accommodation are in no way interfered with, and the child is extracted in the manner most suitable to the existing conditions; lacerations are thus avoided, and undue compression unnecessary. Perhaps, however, no advantage is more striking than (3) the entire absence of undue compression of the child's head, which, from intracranial haemorrhage and other cerebral lesions, not only accounts for fœtal mortality, but the more terrible conditions of imbecility and paralysis so liable to result from excessive pressure. With the old instrument it is impossible to pull with any degree of force without severe cranial compression, while, with the new, the actual force of traction is in no way associated with artificial pressure.

The advantages from the use of forceps are so marked in avoiding exhaustion and prolonged and dangerous pressure, that the tendency to their too early application may be said to have become their chief disadvantage; and the practitioner is but too apt to apply them before real indications present themselves, studying, perhaps, his own comfort before the patient's welfare. There can be no doubt that too early application is unjustifiable, and can only be considered as "meddlesome midwifery." To be scientific as well as practical, nature must be allowed due consideration. One can, therefore, from studying the average normal delivery, lay down fairly clearly a time limit before interference should be thought of, during the second stage. If, therefore, an average second stage in normal labour can be shown to last an hour and a half in a multipara, and two hours and a half in a primipara, there can be no legitimate reason for the use of forceps

unless special indications are present before this time has elapsed. After this time, however, normal labour becomes delayed and associated with danger, and its completion by artificial means is to be recommended. By following these rules one's conscience remains free even should complications subsequently present themselves.

In close company with forceps there comes to be considered the use of chloroform, which, by relieving suffering, must form an important feature in obstetric practice. By its use there can be no doubt the strength of the pains are reduced, although in many instances compensatory advantages—as the relaxation of muscular spasm—are derived. Yet, on the whole, it must be said that chloroform delays labour, and, as a result, gives rise to the more frequent necessity for the use of forceps. Not only so, but it seriously interferes with the voluntary expulsion of the placenta from the vagina, and necessitates its artificial delivery. In this connection a word on the management of the third stage of labour may not be out of place. Except in rare instances of truly adherent placenta, the uterus, within a quarter of an hour, even in the anæsthetised patient, spontaneously expels the placenta into the vagina, where it lies until it is artificially expelled by suprapubic pressure. This manipulation should therefore not be performed until the placenta has been given a reasonable time to be expelled from the uterus. The old-fashioned method of Crêde, or artificial expression from the uterus, must be harmful, by delivering the placenta before it is sufficiently separated, and thus tends towards incomplete delivery and coincident hæmorrhage.

Time has prevented me from touching on more than the fringe of the scientific advances of obstetric practice, and has confined me to the more general questions. Much more could be said of the management of special complications—such as placenta prævia, accidental hæmorrhage, etc.—in the management of which marked improvements have been made. Generally speaking, however, there can be no reasonable doubt that the last quarter of a century has shown advance in the practice of obstetrics equal to those in its sister branches of surgery and medicine. By antiseptics, chloroform, and forceps alone, the worries of the accoucheur have been materially lessened, while our suffering sisters are saved many of the agonies and dangers of bygone times. In one striking instance, however, no advance has been made, namely, the successful treatment of eclampsia. The discovery of its etiology as due to insufficient metabolism is a step in the right direction, and may lead eventually to its curative treatment.

In perhaps no direction has the advance been greater than in the teaching of practical obstetrics, and that particularly in the School of Edinburgh to which I have the honour to belong. By the foundation of a Residency to the Maternity Hospital, the students are enabled to be in touch with the working of the institution

both day and night, and thus see and take part in the management of numerous cases, complicated and normal, so gaining that confidence begot of experience which we previously had to acquire in our respective practices.

I cannot close without thanking you most warmly for the honour you have done me to-day. However inefficient my efforts may have been, and doubtless open to discussion (which I would heartily appreciate), I shall be happy if I have been able to show that obstetrics is in no way lagging behind in the rapid advance of medical science, and that the accusations made against our profession, as regards its practice, are more theoretical than real. A mortality of less than 4 per 1000 is not one to be ashamed of; still, far be it for me to say it cannot be diminished. This can only be acquired by close attention to up-to-date surgical principles and other scientific advances, by the use of which we can at least pride ourselves in possessing a clear conscience, which is the Alpha and Omega of happiness, professional and otherwise.

NOTES ON TROPICAL DISEASES.

By Major D. G. Marshall, I.M.S., *Lecturer on Tropical Diseases in the School of Medicine of the Royal Colleges, Edinburgh.*

Trypanosomiasis and sleeping sickness.—Plimmer,[1] in a recent article, combats the opinions generally held—(1) That trypanosomiasis is simply the early stage of sleeping sickness and (2) that the trypanosome of trypanosomiasis (or Gambia fever) is identical, morphologically and in its pathogenic effects, with the trypanosome of sleeping sickness.

Plimmer draws his conclusions from a limited number of inoculation experiments on white rats, and, briefly stated, they are as follows:—

1. The diseases are distinct, the duration, symptoms, and post-mortem appearances being different.

2. The organisms are distinctly different when grown in the same animals, the *T. gambiense* being longer, larger, and more easily stained than the trypanosome of sleeping sickness, which is stumpy, vacuolated, and stains badly.

3. All cases of trypanosomiasis followed by sleeping sickness are due to a double infection.

The experiments which led to these conclusions were as follows:—

1. Fourteen rats were inoculated with trypanosomes from the blood of a monkey which had been inoculated from a boy suffering from trypanosomiasis. The distinctive features were—(1) Try-

[1] *Proc. Roy. Soc. London*, vol. lxxiv.

panosomes were plentiful and easily found in the peripheral blood. (2) The duration of life after inoculation averaged two months and twelve days. (3) No paralysis resulted. (4) On post-mortem examination, hyperplasia of the spleen and cloudy swelling of liver were found, with many trypanosomes in the capillaries of the brain.

2. Three rats were inoculated with the blood of a monkey which had been inoculated with the cerebro-spinal fluid from a typical case of sleeping sickness. In these three rats the following results (from which Plimmer considers he is justified in drawing his conclusions) were noted:—(1) Trypanosomes were never at any time found in the blood. (2) The duration of life after inoculation averaged nine months. (3) All three rats became paralysed. (4) On post-mortem examination, no organic lesions were found, no trypanosomes were found in the blood, but trypanosomes were found in the cord and brain.

3. In an additional experiment, three other rats, inoculated with the trypanosome of sleeping sickness, became paraplegic in four months. No trypanosomes were found in the blood. On post-mortem examination, the spinal cord showed amœboid forms of trypanosomes, and there were exudations round the blood vessels in the brain—a condition which, Plimmer states, is usually found in man, but never, so far, in monkeys.

These experiments are interesting, but they cannot (as has been done with undue haste by some) be accepted as definitely conclusive, for the following reasons:—

1. There is no proof that the fourteen rats would not have developed paralytic symptoms later. They all died (the cause is not given) in much less than four months, the minimum time in which the other rats developed nerve symptoms. It is well known, and need hardly be pointed out, that in human beings the period between infection and the development of nerve symptoms is often prolonged to six or eight years.

2. It has frequently been shown by many observers, that the detection of trypanosomes in the blood, when scanty in number, is largely a matter of chance; and it is quite probable that in the later series of experiments in which they are noted as being absent, they were present, but mere microscopic examination of the slides failed to detect them. It is noted that they were found in the cord and brain on post-mortem examination. Therefore they must have been in the blood at some time or other, and the failure to find them can only be attributed to faulty methods of examination.

That there are such distinct differences in appearance between the two trypanosomes will not be readily accepted by those who have studied them as obtained directly from cases without intervening inoculation in rats and other animals.

Plimmer's conclusions, derived as they are from a very small

number of laboratory experiments, are in direct opposition to the opinions held by Bruce, Greig, Laveran, and others, who have had opportunities of studying the disease in Africa, and have observed cases for three years or more, from their primary affection with *T. gambiense* to death from sleeping sickness.

Two methods of investigation are open—the first, to work with blood obtained directly from actual cases; the second, to ascertain by experiment whether inoculation with the one trypanosome confers immunity against the other. The former is easy, the latter difficult, owing to the prolonged incubation period of the disease and to the fact that in both men and monkeys the trypanosome may be absent from the blood and cerebro-spinal fluid for long periods and then reappear.

Further work on the above lines is required to prove, or disprove, Plimmer's conclusions.

Schaudinn on the development of trypanosomes.—When Schaudinn's remarkable paper[1] appeared, his results were accepted with reserve, as it was felt they required confirmation.

It is true, the Sergents confirmed his results in a measure, but still his conclusions were not generally considered sound.

Novy and MacNeal[2] give the results of a most elaborate series of experiments by which they endeavoured to verify Schaudinn's results. They disagree with Schaudinn, and state that though they entered on their work with the fullest confidence in the correctness of Schaudinn's conclusions, they found that their results not only did not support, but actually contradicted, these conclusions. They say that Schaudinn's view that trypanosomes in the blood of birds are not distinct organisms, but simply stages in the development of intracellular parasites, cannot be substantiated. They prove that trypanosome infection is very common in birds, and bears no relation to the intracellular parasites, which may or may not be present. They further say, that his two types of trypanosomes and spirochætæ are really two forms of the same species.

Schaudinn doubtless cultivated trypanosomes *in vivo* in the mosquito, but Novy and MacNeal's results show that he was not working with a "pure culture," as the mosquitoes employed were probably, as is often the case, infected with several protozoal parasites, and his apparently positive results were due, not to trypanosoma, but to unrecognised developmental forms of the hæmocytozoa. They, on the other hand, obtained pure cultures of trypanosomes of several species *in vitro*, and found that these pure cultures did give rise in birds to intracellular parasites. They also made a large number of experiments with the blood of birds richly infected with hæmocytozoa, with negative results.

It appears as though Schaudinn had overlooked the well-

[1] "Generations und Wirtswechsel bei Trypanosoma und Spirochæte."
[2] *Journ. Infectious Diseases*, vol. ii. No. 2, March 1, 1905.

known fact that birds are very liable to multiple infection. Laveran found filaria, *H. danilewskyi*, *H. ziemanni*, and trypanosomes together in the blood of an owl. Hanna, in India in 1900, found halteridium and trypanosomes in the blood of a domestic pigeon. Even in this country, Coles has shown that double infection with halteridium and filaria may occur naturally in the blackbird.

A perusal of Novy and MacNeal's paper shows that by their very exhaustive investigation they have proved Schaudinn's conclusions to be incorrect, owing to the fact that he was working, not with a simple, but with a mixed, infection.

They tabulate their conclusions as follows:—

1. Trypanosome infection of birds is very common and widespread.

2. Different species of birds may harbour different species of trypanosomes, and the same species may harbour several species of trypanosomes.

3. Trypanosomes may, or may not, be associated with intracellular parasites. There is no relation between the two.

4. *T. noctuæ* and *Spirochæte ziemanni* of Schaudinn probably represent trypanosomes which have multiplied in the mosquito. They have nothing to do with the life history of the Cytozoa.

5. The frequency of trypanosome infection in birds makes it probable that in the tropics animals and even men may be found to harbour them in small numbers. The presence of trypanosomes does not necessarily mean pathological infection.

With regard to 5, they very correctly point out that the detection of trypanosomes in stained films is an extremely difficult matter when they are present in very small numbers, and that the only sure way of proving their presence or absence is by cultivation. In nineteen out of forty-three birds examined, though they were unable to find trypanosomes with the microscope, cultivation proved them to be present.

It is interesting to note that this is held not only as one of the proofs of the incorrectness of Schaudinn's conclusions, but is also suggested as a source of error in Rogers' work on the "Cultivation of Flagellates from Leishman-Donovan Bodies."

Plague.—It is disquieting to note that there is little sign of abatement of the epidemic of plague in India, even with the advent of the hot weather.

The position is a very serious one, and it is earnestly to be hoped that the Special Plague Commission which has commenced work in India may be able to discover, not only the most important channels of infection, but to suggest measures for the suppression of the epidemic.

It is understood the Commission will devote special attention to the conditions under which the *Bacillus pestis* is found in the

blood: whether it is always present, and (as shown by Hunter and others) very early in the disease, and the length of time during which it persists in the blood, are points on which further information is desirable.

The Austrian Plague Commission made extensive observations for the detection of organisms in the blood, but their methods were unsatisfactory, as they contented themselves with examining stained slides of blood obtained by pricking the finger. The present Commission may be trusted to adopt more thorough measures.

Their work will be followed with interest, not only by those connected with India, but by all scientific men throughout the world.

INSANITY.[1]

By JOHN MACPHERSON, M.D., F.R.C.P.Ed., *Commissioner in Lunacy for Scotland.*

LECTURE VI.

(*Concluded from Vol. XVII. p.* 577.)

I NOW come to the important, and, I am sorry to say, the controversial question of the causes of insanity. After what I have already said on the etiology of the clinical forms of insanity and on the fluctuations of statistical insanity in communities, it seems to me that I might conveniently dismiss this subject by adopting the laconic style of the student who was assigned the task of writing an essay on snakes in Ireland, by saying in three words, as he did, "There is none." But as the great majority of people still believe in the validity of the numerous causes which are popularly believed to create insanity, somewhat in the same way as violent exercise causes fatigue or eating salt fish causes thirst, it is necessary to refer briefly to the subject.

When we apply the word "cause" to insanity we must mean one of two things, namely, either the cause of the whole hereditary and pathological processes which culminate in insanity; or the agencies which precipitate individual attacks of insanity in a pyschopathic subject.

1. The causes which are supposed to produce insanity *de novo*. The fact that an individual may live free from any suspicion of mental unsoundness for the first two decades of life has undoubtedly tended to obscure our notions regarding the causation of mental disease, and has led us to seek for external explanations where a little consideration would enable us to perceive that in this respect insanity does not differ from other constitutional diseases, such as cancer, phthisis, or gout. If a disease is trans-

[1] "The Morison Lectures," delivered before the Royal College of Physicians, Edinburgh.

missible from ascendants to descendants its appearance must follow the course of the development of the individual, otherwise we should meet with cancer and angina pectoris in childhood; while rickets and the disorders of dentition should be equally common in the later as in the earlier decade of life. Insanity not being one disease, as we have seen, but a heterogeneous group of many diseases, we cannot speak correctly of its "cause" any more than we can intelligibly speak of a cause of the diseases of children or a cause of tropical diseases. It is worse than useless, therefore, to publish tables of the causation of insanity which make no reference to the special affection which the cause is supposed to produce. I say "supposed," because causation can at best be only a matter of opinion. What do we mean when we ordinarily use the word "cause"? We must mean one of two things. Either, that because two phenomena occur regularly in a certain sequence they therefore stand to each other in the relation of cause and effect. Or, that because two phenomena occur in association, the one necessitates the appearance of the other. The fallacies of the first proposition are that, if it were universally true, we should be compelled to the conclusion that, because day and night regularly succeeded one another, the one was the cause of the other. Obviously day and night stand in no such relation to one another, but the same fact is not always so clear in the case of many other natural processes with which we are less perfectly conversant. Again, it is not possible to isolate any single phenomenon in sequence of events and call it a "cause," for one thing depends upon another in infinite regression back into eternity. The possible fallacies in the second case are numerous. Among the simultaneously occurring phenomena we select one in which we are most interested and call it the "effect," and then we look for the "cause" among the other simultaneously occurring phenomena. Such a quest is natural and in accordance with the constitution of the human mind. Yet though the process is the source of all human knowledge, it is no less the source of all error. If the human mind were perfectly co-adapted to natural phenomena, there would be no danger of mistake, for knowledge would be perfect and speculation unnecessary. But as we are mentally constituted, we almost invariably fall into error through selecting, not the true cause, but the one which we would rather believe to be the true cause. It is a well-known fact that when a person is hypnotised and told to do a certain action, say an hour afterwards, he will perform the action without the least recollection that it has been suggested to him; but when he is asked why he did it he will furnish a number of plausible reasons, just as if he had spontaneously performed the act for sufficient conscious reasons. That is, I think, one of the most wonderful and suggestive facts in hypnotism. It explains our insatiable desire to find a cause for everything, and it also explains why we are generally mistaken.

In order to be able approximately to assign a cause to any effect, it is first of all necessary thoroughly to know the nature of the effect itself. If we do not know what insanity is, how can we pretend to know what its causes are? It was the profound ignorance of the disease which led to the theory of its supernatural origin, and it was only in proportion as our knowledge increased that we have been able to formulate more rational ideas of its associated phenomena. But as our knowledge of the fundamental facts of insanity is as yet only fragmentary, our opinions regarding its causation are still necessarily crude and imperfect. All we can honestly claim to assert is, that certain symptoms have been preceded or accompanied by certain definite phenomena which have been ascertained to precede or accompany similar symptoms in a fixed and constant ratio. Take for instance the use of the word cause as applied to the numerically expressed relation of syphilis to general paralysis. In the first place, we do not know enough about general paralysis to assign it to any one cause, and, in the second place, syphilis cannot be the cause of general paralysis, for only an extremely minute fraction of the subjects of syphilis become general paralytics. Alcoholism was discussed in the third lecture, where it was, I think, successfully proved to be a neurosis closely allied in its symptomatology and heredity to the other neuroses and to insanity. That being so, its prominent place in a classification of insanity need be a matter of no surprise. Its combined homologous and dissimilar heredity is between 80 per cent. and 90 per cent. of the cases of alcoholic insanity. It may seem absurd to discuss the question of the etiology of alcoholism for, of course, if there were no alcohol there could be no alcoholism. Yet even here, so complicated are the causes of mental disorder, that it is necessary to point out that the true cause is a defective heredity which (1) induces the subject to crave for a particular mental state—not for alcohol, but for the state which alcohol most conveniently produces; (2) which provides the subject with a constitution which is particularly susceptible to the influence of such poisons as alcohol; and (3) which is in many cases the cause of a mental unsoundness independent of alcohol.

2. The causes which precipitate individual attacks of insanity.

If we restrict the term "causes of insanity" to those agencies which precipitate individual attacks in predisposed persons, we are on more limited and less important grounds. There are no doubt innumerable such agencies, but I question if a tabulation of them is so profitable or so beneficial as some people are apt to believe. Take, for example, the causes of an epileptic fit. In the same individual different agencies at different times determine the onset of a seizure. At one time it may be alcohol, at another time an error in diet, at another time a violent mental impression, while at other times the fit comes on without any assignable cause—

merely as a manifestation of the morbid periodicity of the disease. Is it not a misuse of language to call these and similar agencies "causes" of epilepsy? It is the same with insanity. "When we are told (says Maudsley) that a man has become mentally deranged from sorrow, need, sickness, or any other adversity, we have not learned much if we are content to stay there; how is it that another man who undergoes an exactly similar adversity does not go mad?" The great question of the present day and one which is constantly asked by the public is, "What are the causes of the increase of insanity in the population?" The obvious reply is to ask in return whether there is any real increase of insanity. I have fully convinced myself (I do not know if I have succeeded in helping you to the same conclusion) that there is no increase of insanity. I am willing, however, for the sake of argument, to look at the question in another form, and ask why is not the proportion of insanity less than it is? The causes generally assigned are those which produce physical deterioration of the members of a community. These are overcrowding, density of population, improper food, alcohol, and physical diseases. It might be pertinent, before discussing this question, to ask whether physical deterioration, in the sense in which the word is popularly understood, really occurs at all. Very grave doubts have been expressed on the subject by competent authorities, and no proof of such deterioration has been brought forward. When it is seriously argued, however, that alcohol, improper food, and diseases of all kinds do not so much produce insanity in the *first* generation, but by their action on the sexual elements of the parents induce an unstable condition in the brains of the next generation;[1] in short, that these evil influences have caused variation in an unfavourable direction, all that can be answered is that such statements are founded on speculation, and should not therefore be put forward as a working scientific hypothesis. I do not profess to know the causes of variation, but it is evident that the promoters of this theory have misunderstood the meaning of the term variation. The word, as scientifically understood, means divergence from a standard mean of any quality. It implies divergence to both sides of the mean; therefore it is both good and bad. If the mean height of a population is 65 inches, then, for every man that is 60 inches in height, there is another 70 inches high. On this hypothesis one is equally justified in asserting that alcohol causes genius, as that it is a cause of genetic insanity. Even if we assumed that alcohol directly increased the amount of genetic insanity in a community, we would have to satisfy ourselves also as to whether the drinking habits of the people in that community were increasing or decreasing. If the historical accounts of the

[1] Dr. Wigglesworth, "Evidence Phys. Deterioration," Com. 8983; and Dr. Ford Robertson, *Brit. Journ. Inebriety*, 1904, p. 104.

drinking habits in this country are not fallacious and garbled, there can be no doubt that the people are much more sober than they were 150 years ago, and are steadily becoming more sober year by year.[1]

On the whole, while we may be ready to acquiesce in deploring the insanitary, diseased, and alcoholic condition of many portions of our urban population, the question in the light of statistics does not bear upon the increase of insanity in any way that I am able to make out. On the contrary, there is evidence which goes to show that, whatever the social and moral condition of a people, a strong and effectual effort is made by nature to counteract these inimical surroundings.

I select the following striking remarks from the evidence given before the recent (1904) Commission on Physical Deterioration.

Dr. Eichholz said: (566) "The number of children born healthy is, even in the worst districts, very great. The exact number has never been the subject of investigation, owing largely to the certainty which exists upon the point in the minds of medical men; but it would seem to be not less than 90 per cent." (646) "The percentage of badly born children among the poor is not sensibly greater than among the rich, and such diseases as are hereditary, such as insanity and neuroses, in which we include alcoholism and other inherited diseases of bad living, affect the one as much as the other." Professor Malins of Birmingham, President of the Obstetrical Society of London, said: (3124) "I think the testimony of experienced observers would be in accordance with the views expressed by Dr. Eichholz, though, perhaps, not to such a large extent. I should say that from 80 to 85 per cent. of children are born physically healthy."

If the poorest and most ill-nurtured women bring forth as hale and strong looking babies as those in the very best conditions, the interpretation would seem to follow that nature gives every generation a fresh start. It must also follow that environment has very little to do with the antenatal condition. Children, it would seem, are not necessarily born degenerate, though born in the most sordid surroundings, and though born of parents who have acquired evil habits of life or unsound bodily health. All that the majority of these children require to make them average citizens is a chance in life—a chance to escape into better, healthier, and cleaner moral and social surroundings. I am confirmed in this statement by the marvellous results obtained in Glasgow by boarding out "slum" children in the houses of the peasantry throughout Scotland, regarding which we heard a good deal at the International Congress for Home Relief held in this city last June. We were informed on good authority that about

[1] *Vide* Samuelson's "History of Drink," and Shadwell, "Phys. Deterioration Committee" (12280–86).

80 per cent. of these children turned out well in life, which is saying more than even an optimist would be inclined to say of ordinary children.

Our opinions on the prognosis of insanity must vary according to the view we take of the nature of the disease. To those who regard insanity as an accidental malady like measles or whooping-cough, to which every one is subject, and which can be prevented by nurture and careful hygienic precautions, there is of course an unlimited field for optimistic opinion as to its cure and prophylaxis. To those, on the other hand, who, like myself, look upon it from the point of view of a genetic variation, the outlook is much less hopeful. Looking at the facts as they stand, there does not seem much hope of a speedy confutation of the latter view. Out of every hundred inmates of a modern asylum for the insane, twenty are recent cases, that is to say, they have been less than a year in residence. They form the only material from which any hopeful results are to be obtained. It would be wrong to say that no patients recover after a year's illness, but their number is so small, that—dealing as I am with large numbers, and not with the special experience of any one physician, or any one institution—they are for practical purposes negligible. The following table shows the length of residence of 320 patients who recovered in the asylums of the Department of the Seine in the year 1897 :—

TABLE I.—*Duration of Treatment of the Patients who recovered in the Asylums of the Department of the Seine* (1897).

Duration of Residence.	Number Recovered.	Percentages.	Mean.
1 month and under .	92	11·21	
From 1 to 2 months .	115	14·02	
,, 2 ,, 3 ,, .	172	20·97	
,, 3 ,, 4 ,, .	113	13·78	1 year—91·35 per cent.
,, 4 ,, 6 ,, .	124	15·12	
,, 6 ,, 9 ,, .	74	9·02	
,, 9 ,, 12 ,, .	60	7·31	
,, 1 ,, 2 years .	33	4·02	2 years—4·02 per cent.
,, 2 ,, 5 ,, .	22	2·68	2–5 years—0·89 per cent.
,, 5 years and over .	15	1·82	
Total .	820	—	

We see from these figures that 91 per cent. of the patients recovered within a year; 4 per cent. between one and two years, and only 0·8 per cent. after two years. What of the after-history of those who recover? The answer has been very tersely given by Dr. Thurnam, who was the founder of modern lunacy statistics. He

says: "Of eleven persons attacked by insanity, six recover, and five die sooner or later during the attack. Of the six who recover, not more than two remain well during the rest of their lives; the other four sustain subsequent attacks during which three of them die." The matter has been put similarly, but in different form, by Sir Arthur Mitchell,[1] who recorded the condition, twelve years after, of 1297 patients admitted into Scottish asylums for the first time, and who had not previously been insane. Of these, 851 recovered, 261 did not recover, 412 died, 499 were re-admitted, and 273 remained. In other words, 36 per cent. died insane, 32 per cent. were then alive but insane, and 32 per cent. were either alive and sane or had died in a state of sanity. Making allowance for the future history of those who were then alive, the writer concludes that only 27 per cent. of the whole 1297 admissions were likely to die sane. This is far from encouraging as a basis on which to build any strong hope for the ultimate triumph of medical skill. For even if there were a basis of scientific treatment in existence, which there is not, it is evident that the inimical forces to be overcome are exceedingly powerful. Let us glance briefly at the question in the light of what I have already said on the nature and forms of insanity. To begin with, it is manifest that, wherever there is an inherent mental defect of genetic origin, we can do nothing by way of adding to nature's endowment. At most, we may train and educe the latent qualities that are already there. It is the same with the recurrent insanities and the neuroses. We can certainly conduce towards recovery from the individual attacks, but we can do little or nothing to check the tendency to recurrence. So with the neuroses. The epileptic fit is, as we all know, eminently recoverable from—not so with epilepsy itself. It must be ever borne in mind that when we speak of recovery in a true case of mania-melancholia, we refer to the individual attack, and that we can only hope—at the best—for a modified tendency towards recurrence. When we turn to the confusional insanities the case is somewhat different. There is a less tendency to periodicity, but unfortunately the individual attacks are more severe, and the destructive action of the toxins upon the brain cells is more rapid and more effective. I have shown that upwards of 40 per cent. of the admissions into asylums belong to this group. It is here, if anywhere, that our hope for the future of psychiatric medicine lies. According to Kraepelin, from 14 per cent. to 20 per cent. of all patients admitted to asylums are the subjects of dementia præcox, of whom, he says, only 8 per cent. recover. General paralysis is as yet a hopeless disease. Puerperal insanities are favourable on the whole, but under the influence of the more extensive employment of antiseptic precautions in obstetric

[1] *Journ. Ment. Sc.*, London, 1877, January.

practice their occurrence is gradually becoming less frequent. The most favourable cases of all are those suffering from acute alcoholism, of whom there are far too many in asylums. The confusional insanities must be attacked with the weapons of modern medicine; especially must that extremely unhopeful group of affections, known as dementia præcox, be brought under early treatment, for the destructive processes are so rapid that time is everything. We must first of all discover the nature of the toxin which, if it does not originate the symptoms, at any rate gives to the affections their serious import. When we have discovered it, we shall probably in time be able to counteract it. The only way to advance our knowledge of these diseases is by hospitalising the treatment of the patients in exactly the same way as is done by the study and treatment of ordinary patients in general hospitals attached to large centres of scientific research, such as exist in university centres. I say hospitalisation, for it must be manifest that persons suffering from such serious maladies, as most of the types of confusional insanity really are, require the best form of hospital treatment if they are to have any good chance of recovering from the grave symptoms of which they are the subjects. It is perhaps true that as yet the basis of any treatment is only empirical; but with the spread of more accurate knowledge regarding the pathogeny of these affections, every day is bringing us nearer to a rational basis of treatment. In all cases of insanity, complicated with leucocytosis, there is a state of high blood pressure which aggravates the symptoms. The surest and the safest way of modifying that high arterial tension is by rest in bed. In a paper by Lewis Bruce and Alexander,[1] I find the following suggestive remarks, "During the early period of the attack, when the pulse was quick, the temperature sometimes elevated, the patient sleepless, and the mental symptoms acute, the arterial pressure was high, varying from 140 to 180 mm. Hg. If the patients were kept in bed, and the arterial tension taken night and morning, we found that in the course of a period of very variable duration the tension gradually fell to 120 or 130 mm. Hg., this being preceded by a fall in the pulse rate; the temperature tended to be slightly below the normal, all the mental symptoms lost their acute character, and the patients began to sleep again at night."

There could be no better statement on which to base the argument for the hospitalisation of acute cases of insanity than this. We have hitherto regarded mental affections too much from the mental side to the exclusion of the grave physical changes which underlie the mental manifestations. In the great majority of acute mental affections there are the following physical symptoms present, namely, leucocytosis, an increase in temperature, insomnia, profound digestive disorders, and meta-

[1] *Journ. Ment. Sc.*, London, 1900, October.

bolic changes which are apparent in the marked alterations in the normal constituents of the urine and other secretions. While those morbid changes last in their intensity, it must be evident to everyone that a person suffering from them is much more seriously ill than a superficial description of mere mental symptoms would lead us to suppose. In short, we are gradually being forced to the conclusion that the mental symptoms in the acute psychoses are mere manifestations of a disordered physical condition, just in the same way as the delirium of fever is a mere symptom of certain phases of intoxication of the nervous system. If this view is to prevail, it will entail a revolution in our present methods, for it is to the body, and not to the mind, that, in the first instance, remedial measures must be directed. The necessary consequence of such a general attitude towards mental affections of the acute type will assuredly be the breaking down of the distinctions which have up to the present separated the treatment of acute insanity from the treatment of other bodily diseases. Thanks to the labours of a few distinguished workers in various parts of the world, the time for the expectant treatment of acute insanity, based on the theory that it is a pure nervous storm with secondary physical symptoms, is over, at any rate for the present, and can only be revived by incontestable scientific proofs. But if the patient is not a rich man, he cannot, under the present system, receive either treatment or advice except within the walls of an asylum, from which he and his friends naturally shrink so long as the character of his mental symptoms do not necessitate his removal thereto. It comes to this, that a man suffering from any form of mental affection of an acute character must, if he cannot afford to be treated in his own house, be certified and removed to an asylum, without the opportunity of being first examined and observed with a view to ascertaining whether his malady is of such a nature as to require such removal. The existing lunacy laws were framed, among other reasons, with a view to securing the liberty of the subject, and, for a long time to come, probably that safeguard must be retained; but in respect of the point I am now discussing, we have outgrown these laws, and, so far from securing the subject's liberty, they have the contrary effect, and actually conduce towards depriving him of his liberty. In the interest of the sufferers, for the furtherance of science, and for the spread of knowledge in the medical profession, it is essential that in every large city, and especially in every university city, there should be hospital wards for the treatment of acute insanity open to the public and to medical students in exactly the same way as are the other wards of a general hospital. To these wards should be attached an out-patient department to which patients may come for advice. The want of such an establishment in every

great urban centre in this country is an expression of passive cruelty and indifference, which can only be described as a blot upon our much vaunted civilisation. In this respect, Germany, Italy, Austria, Switzerland, and some of the States of the American Union are ahead of us. I can only afford time to glance at one or two of the admirable provisions made in these countries, not only for the treatment of new and acute cases of insanity, but also for the so-called borderland cases and neurotics of all kinds.

There are twenty universities in Germany, and in connection with each university town there is a clinic for mental diseases, the chief of which is the professor of psychiatry in the university. These clinics are of various forms. Some of them are wards of general hospitals, others are separate pavilions in connection with hospitals; others again are detached buildings with separate organisation, but always forming a part of the group of clinics which form a modern German hospital and medical school.

The psychiatric clinic of the University of Heidelberg, which was opened in 1878, contains about 150 beds, and about 320 patients, on the average, are annually treated there. It forms a part of the buildings of the medical school of the university.

The clinic of the University of Tübingen is one of the most modern and best equipped in the German Empire. It was opened in the year 1893, and has 120 beds. On an average, over 300 patients pass through it annually.

The clinic of Giessen, in the Grand Duchy of Hesse, which was opened in the year 1896, consists of eight separate pavilions for a population of from eighty to a hundred patients. In many respects it is quite unique, and one of the most admirable institutions of its kind in the world. Time will not allow me to describe its various good qualities. I must content myself by referring any of you who are interested in the subject to the recent report of Dr. Serieux to the Department of the Seine, upon the care of the insane in Germany and other European countries.

The clinic of the University of Wurzburg, in Bavaria, is a comparatively small one, having only sixty beds, but it manages to pass through its wards no less than an average of 207 patients in the course of a year.

In the State of New York, a pavilion for the reception of recent and acute cases of mental disease has been erected in connection with the new hospital of the city of Albany. The design provides a two-storey building, connected with main hospital by a corridor, and conforming with the latter in architectural style. This pavilion furnishes—(1) Transient accommodation for patients about to be certified; (2) for patients who need observation; (3) for mild cases of insanity who may recover

in a general hospital: (4) for rapidly developing cases of delirium: and (5) for the sudden and often dangerous forms of mental disorder which occur in the course of general diseases, or after the shock of surgical operations.

The reasons for establishing clinics for mental affections in Germany are the same as some of us have been urgently pressing for several years in this country. They are necessary for supplying early advice and treatment of patients labouring under acute insanity; for the remoteness of most of the asylums from the large centres of population, and the formality and certification required for admission, renders them unsuitable for this purpose. Moreover, a large and increasing number of the patients who urgently require treatment in such clinics are not certifiable as lunatics, and should not be subjected to the necessity of certification before they can obtain treatment or advice as at present. I refer to neurasthenic, alcoholic, epileptic, and other borderland cases of insanity. At Giessen, in 1896, 6·5 per cent. of the total admissions were not certifiable; but in 1901 there were 23 per cent. who were not certifiable, showing how the necessity for the institution existed all along, and how, as its usefulness became gradually known, it has been more and more taken advantage of. "The beneficial influence exercised by the twenty university clinics of Germany is easy to realise (says Serieux). They have given a vigorous impulse to the study of mental diseases. They form the scientific centres or nurseries for the proper education of the medical profession in psychiatry, and they show the ideal to which the provincial asylums should aim, namely, to become hospitals for the treatment of diseases of the brain." Within the United Kingdom, at the present time, there is not a single clinic which serves the purpose I have been describing. How long we are to remain in this unenviable position depends upon the medical profession, and upon the ethical sense of justice and humanity of the British public. I would not be doing justice to one city in this country, if I did not modify what I have just said by referring to the magnificent provision which the Parish Council of Glasgow have recently made in one of their new central hospitals for the observation and treatment of incipient cases of insanity. Two wards, one for men and one for women, each containing twenty-five beds, have been fitted up with every necessary care for the comfort and nursing of this class of patient.

If we analyse the population of a modern asylum, we find that about 20 per cent. of the inmates are recent or acute cases, who have been less than a year in the institution. The remaining 80 per cent. can be divided into two classes—(1) Those who are quiet, manageable, and require no special nursing; and (2) those who are for physical or mental reasons confined to bed, or who,

though not confined to bed, are in need of more or less constant care or supervision. Out of every 100 patients who have been more than a year in a Scottish asylum, sixty-four require the care and attention which can only be received in an institution, and thirty-six are quiet, harmless, and not in need of the same special care. For the latter class residence in an asylum is not by any means absolutely necessary. It is pretty well known among those who are interested in lunacy administration all over the world, that between 18 and 20 per cent. of all the pauper lunatics in Scotland are living in private dwellings throughout the country. On 1st January 1904, there were 11,404 in establishments and 2658 in private dwellings. It is, however, necessary in the interests of the insane, as well as in the interests of the ratepayer, that a very great deal more should be done to remove from institutions those patients who do not require confinement or restraint. With regard to the patients referred to, it may be at once conceded that a certain number of them are content in asylums, that a certain number of them would not be happy anywhere, and that a certain number who are quiet in institutions would not remain placid and manageable under any other condition of life. But when these admissions have been made, there remains a large proportion to whom life in an institution is irksome and all but intolerable. For those for whom no other kind of life is suitable or expedient nothing else can, of course, be suggested. The interest of the ratepayer comes to be considered when it is apparent that the money he is called upon to expend is unnecessary, and that other means preferable or superior to the old methods of perpetually adding on accommodation to asylums which, for such patients, costs from £100 to £200 per bed, can be provided at infinitely less cost. For these reasons, there is a duty laid upon us to extend the scope of the boarding-out system, which in Scotland has done so much to increase the happiness of the insane poor, and to relieve the public of a steadily growing expenditure. In the meantime, there is in Scotland a sufficient margin of opportunity for doing this for many years to come; and should that margin ever become exhausted, there are fortunately other applications of the same system which have been highly successful in other countries. In Germany, the system of colonies attached to asylums and under the supervision of the asylum medical officers has undoubtedly conduced towards the disencumberment of the institutions from an accumulation of the quieter chronic patients, given the patients themselves more natural and more cheerful surroundings, and greatly reduced the cost of maintenance. Outside Scotland the favourite form of family care has been the "colony" system. This system, which is typically represented at Gheel and Lierneux in Belgium, and at Dun-sur-Auron in France, may be briefly described as the concen-

tration of the insane in the private houses of a village or series of adjoining villages under the supervision of a medical and lay staff, whose duties consist in administration and supervision. A small central hospital serves at once the purpose of a sick room for patients suffering from physical ailments, and a retreat for those who are overtaken by recurrent temporary attacks of insanity.

In the preceding lecture I spoke of the increase of insanity as an expression of the ethical attitude of the public towards disease. If there is any truth in that remark, we are very far indeed from having gauged the depths of the neuropathy or psychopathy of the community. Of this opinion there is sufficient proof in the recent legislation for the care of inebriates, in the movement for the founding of epileptic colonies in the increased interest in the study of criminology, and in the general tendency of society to regard the actions of its anti-social members as irresponsible. It is a remarkable fact that, while individuals will often violently oppose such opinions as I have indicated, the general sense of the community is slowly but surely coming to regard it as necessary that the State should isolate in colonies such anti-social units as inebriates and weak-minded offenders, and such helpless neurotics as epileptics. There are many persons in this country, especially in the large towns, whose repeated convictions for petty offences in the police courts raise prominently the question of their mental unsoundness. It is true that the great majority of these chronic offenders are inebriates, but the State has already acknowledged the mental irresponsibility of the more confirmed section of this class. Many, however, are not inebriates in the true sense of the word. Some of them are kleptomaniacs, others are imbeciles who tend to commit breaches of the peace upon trivial provocation; others again are so irritable or profligate, or so lacking in self-control, that they are incapable of directing their own conduct. It is lamentable that our civilisation should be unable to devise any other means for dealing with these people than repeated committals to prison for short periods varying from three to ninety days. It is not too much to say that some weak-minded offenders pass most of their time in gaol. I have in mind one man who does not have more than a few days of liberty out of the three hundred and sixty-five. This man has been frequently in asylums, and is undoubtedly insane, and yet a highly civilised nation possesses no other way of dealing with him than by repeated prison sentences of ninety days every time he appears at the bar of a police court. This is by no means an isolated instance. I am acquainted with many similar cases, and my friend Dr. Crawford Dunlop could cite them by the score. I append a table extracted from the last issue of the Judicial Statistics (1903) for Scotland, which enumerates the number of persons who had had upwards of fifty previous convictions:—

TABLE II.—*Showing the Number of Persons Convicted for Petty Offences in Scotland in* 1903 *who had had more than Fifty Previous Convictions.*

Number of Previous Convictions.	Males.	Females.	Total.
50 to 100 . . .	378	604	982
100 to 150 . . .	78	187	265
150 to 200 . . .	5	52	57
200 to 300 . . .	0	28	28
Over 300 . . .	0	1	1
Totals . . .	461	872	1333

It is only the shortness of human life which limits the number of these convictions. I have taken the standard of fifty previous convictions, because there might be some doubt as to the mental irresponsibility of the subjects of a smaller number. I can hardly conceive that any one could be callous enough to hold that a person who has had upwards of fifty convictions, for any reason, is mentally sound. In any case, the truth can be arrived at in another way, namely, by the individual examination of each of these persons. The process is naturally a slow one. Dr. Dunlop has been engaged upon it for the past two or three years, and has already tabulated more than two hundred weak-minded and insane persons of this class.

But whatever opinions may be held as to the sanity or insanity of these 1300 persons, every one will admit that their repeated committal to prison is useless; that it produces no reformation; that it rather tends, if that is possible, to callousness and farther degradation. Moreover, it is by no means a cheap or inexpensive method. What then is to be done with such people? Without doubt they ought, as early as possible in their career, to be relegated under undeterminate sentences to institutions of the colony type, such as I shall immediately describe. The Committee on the Physical Deterioration of the People (1904) make the following recommendation in their report—"It may be necessary, in order to complete the work of overcrowded slums, for the State, acting in conjunction with the local authority, to take charge of the lives of those who, for any reason, are incapable of independent existence up to the standard of decency which it (the State) imposes." The 1300 persons to whom I have

referred might, for this purpose, be divided into two classes, according to whether they are certifiable as insane under the present standard of certification, or are not. Those who are so certifiable might be sent to the ordinary asylums: those not so certifiable to labour colonies on the lines of the Salvation Army Colony at Hadleigh, with power of compulsory detention. There are reasons, however, why it would be better that they should all be treated together in a central institution. All the benefits of a labour colony are afforded in the construction of an institution similar to a modern village asylum. Certification is a variable, and in many respects a useless distinction, except in so far as it safeguards the liberty of the subject, which in this instance is not in question. It would of course be undesirable to commit any person to such an institution without full judicial inquiry, at which medical evidence would be taken. Such an institution should be under the charge of a physician trained in the treatment of mental diseases, and assisted by a specially trained staff of assistant physicians. In short, it should be managed exactly like a modern asylum, and should have no prison element about it at all. It should possess abundance of land for agricultural and other pursuits. It should be built upon the village type, and possess a central hospital for the treatment of physical disease, of recurrent attacks of insanity to which this class are peculiarly subject, and for the observation of cases whose mental condition requires prolonged clinical study before judgment is pronounced in criminal cases. Under the present system, the mental condition of a prisoner on trial is too often decided in Court upon the partisan evidence of medical witnesses, who generally contradict each other upon data which are notoriously inadequate for the formation of correct opinions. Such a procedure has long ago been discarded in many of the American States and in Germany, where special facilities for observation ("Bewahrungshauser") are provided. It is a question to be considered, whether such an institution as I have described should be also an asylum for criminal and dangerous lunatics or not. But, whatever its other functions, one thing is abundantly clear to my mind, that it ought not to be in any sense a penal institution, and for the same reason that it should not be in any way connected with the administration of prisons. I have indicated that a large proportion of the class of persons referred to are inebriates. Those who understand such matters tell us that they are that and something more besides. They are cursed with a mental and physical organisation which stamps them with the unmistakable signs of mental alienation which may or may not be of the ordinary type. It is on this account that their treatment is so hopeless, and that we so constantly hear of the inoperativeness of the recent legislative enactments for the treatment of inebriety. The terms "Reform-

atory" and "Reformation" as applied to such cases is a misnomer. Most of the persons who, under the existing laws, qualify for committal to Inebriate Homes and State Reformatories can no more be reformed than an imbecile can be made intelligent by subjection to disciplinary treatment. I believe that there is a large class of reformable inebriates if they could be brought under early treatment, but that is a totally different question from the one under consideration, and one which has not as yet received practical attention. The class of inebriates I am referring to are practically the same as the class which I have designated "weak-minded chronic offenders," and ought to be treated in exactly the same way, namely, by indeterminate sentence to such an institution as I have described. A word as to epileptics. In Scotland we are very far behind other civilised nations, in so far as we have no national institution for the reception of this pitiable class of the community. Far too many of these are confined in asylums as ordinary certified lunatics, where they are unhappy, and where they are consequently more troublesome than in other countries where special provision is made for their separate treatment. We require a national institution for epileptics on the lines of the great epileptic colony of Bielefeld in Germany.

I come now to the important question of how these institutions are to be organised and administered. In the first place, Scotland being a small country, they must be central institutions. If they are central they must be State institutions, with this provision, that each district or community shall pay for the maintenance of its own members who are inmates of the institutions. But if they are to be State institutions, they must be subject to State inspection and supervision. Upon the question of who the supervising body should be, depends the welfare and success of the whole scheme. There are already a sufficient number of public departments in Scotland, and the creation of a new one *ad hoc* is to be deprecated. If the Scottish public departments are to remain as they are at present, then I have no hesitation whatever in declaring my opinion that institutions for the various classes I have mentioned should be under the lunacy authority. I do not pretend for a moment that they would therefore be better managed. It is the duty of the country to see to it that such institutions are efficiently conducted whoever the superiors may be. My reasons are as follows—(1) The persons to be treated are either insane or weak-minded, or suffering from physical infirmity. (2) If there is to be any advance in our knowledge of the processes which underlie the various symptoms of mental and physical deterioration, under which most of these patients labour, they must be studied medically exactly as other forms of mental affections are studied by trained and skilled physicians. (3) The medical element in administration must prevail to the

exclusion, or at any rate the subordination, of the penal. (4) The intimate alliance of the malady of the certified with that of the uncertified insane would necessitate the constant interchange of individuals from the one class of institutions to the other. (5) The construction, management, and hospital character of modern asylums is essentially the same as ought to characterise any modern institution for the reception and treatment of epileptics, inebriates, and weak-minded offenders. Sooner or later some such proposal as I am now formulating must in one form or another come into practice, and it is highly desirable that it should emerge under the influence of the best available traditions. The traditions of the lunacy system in Scotland are exactly the traditions which are required for dealing successfully with the weak-minded offender and the inebriate. It is useless to think of punishment, which at best can only be defended as a means of reform. But if we believe, as we surely must do, that reform in this instance is difficult to attain, and that the main object is to preserve the decency and order of the community, and to promote the welfare of the individuals concerned, then we must adopt some such scheme as I have sketched. Not only are the traditions of the lunacy system in this country the most desirable for dealing with the class in question, but the construction of the modern asylum of the village type is the best imaginable form of institution for their detention, for it combines the advantages of the hospital system with that of the labour colony.

The great advantage of the "village" asylum is the segregation of the various buildings into small villas, which permit of the classification of the inmates to any extent that is desired, so that the quieter inmates can be wholly separated from the noisy and more turbulent, the acute patients and those requiring active medical treatment from those who are in need of no treatment; and finally, those who are capable of enjoying more extended liberty can live apart from those whose actions demand, for any reason, close supervision. There is, in fact, no limit to the extent of the classification which can be carried out in such an institution, so that patients of all classes can be accommodated in it without any danger of interfering with each other or affecting the harmonious working of the asylum. So much is this the case, that in some German and Italian asylums of this type there are separate villas for the reception and observation of criminal lunatics, whose residence in no way incommodes the life of the other patients with whom they do not come in contact. The village type of asylum has been in existence in Germany for many years, and was there first of all made famous by the well-known asylum of Alt-Scherbitz in Prussian Saxony. We owe its introduction into this country to Sir John Sibbald, who recommended the erection of that type of institution for the new City Asylum at Bangour.

The idea was adopted by the Aberdeen District Lunacy Board in the construction of their new asylum at Kingseat, which is now in full working order, and is the first village asylum opened in Great Britain. At the present time there are two other similar asylums in course of construction, namely, the Edinburgh Asylum at Bangour, and the new asylum for Renfrewshire at Dykebar, near Paisley.

The village type of asylum has not only greatly facilitated our methods of dealing with the insane, but it has permitted us to see how, in the future, the problems of undertaking the suitable dispositions of the accumulating masses of the insane, for whom asylum treatment is absolutely necessary, are to be solved. It combines the advantages of the home and of the labour colony. It has taught us how to cheapen the construction of asylums, while rendering them more efficient and more adaptable to their purpose; and above all, it has shown us that the hard lot of the insane can be made a little brighter and happier than under the old, more expensive, and more cumbersome methods of erecting palatial prison-like buildings.

All these developments in asylum construction and lunacy administration point to the conclusion that a time is approaching when the treatment of acute insanity will be sharply separated from the care of the chronic insane, and to such advances in our knowledge of the pathogeny and pathology of acute insanity as will enable us, without prejudice, to treat mental disturbances as we now treat pneumonia or enteric fever in ordinary central hospitals; while the chronic insane will be cared for in colonies and village asylums under the most favourable circumstances as regards home life, occupation, and classification.

REVIEWS OF BRITISH AND FOREIGN LITERATURE.

The Effects of Tropical Light on White Men. By Major CHARLES E. WOODRUFF, A.M., M.D. London: Rebman Company Ltd. 1905.

THE wonderful results which have, in recent years, accrued from the employment of various modifications of light in the treatment of disease, have dazzled the eyes of the world, and have undoubtedly led to an exaggerated importance being attached to this agent. "More Light," not merely figuratively but actually, has been the cry. And yet we can certainly have an excess of illumination which may prove in the long run more detrimental than a deficiency. While nature sheds in places a brilliant even a glaring sunshine, she also takes care to provide shade, and this in its most perfect form, that from trees is tinted green as being most refreshing to the eyes from its position midway in the spectrum between the red and the ultra-violet, or the heat and the actinic rays. Bringing to his task an immense amount of reading and observation, Dr. Woodruff has made a most valuable as it is a most interesting contribution to the study of the effects of light. He states in his preface that "this work has its origin in an attempt to prove or disprove the theory announced by van Schmaedel in a paper read before the Anthropological Society of Munich in 1895, that skin pigmentation of man was evolved for the purpose of excluding the dangerous actinic of short rays of light which destroy living protoplasm. It gave at once the reasons for the evolution of nigrescence and blondness, the reasons why Europeans have always failed to colonise in the tropics, and why blonds disappear when they migrate from their northern home, and finally gave rise to practical hygienic rules for white men compelled to reside in the tropics."

It seems a small thing that mere tint of skin should influence migration and permanance of occupation, yet the evidence in support of this adduced in the book before us has much in its favour. The blond and intelligent rulers of regions suited better for more swarthy inhabitants have regularly in course of ages died out, while their subjects, thoroughly acclimatised to their domicile, remain. Egypt is cited as a case in point. It has been the theatre of immigration of intellectual races over and over again; in each case these disappeared, and civilisation decayed, though the native Fellah survived and survives. "There will," the author predicts, "never be another dark age, for the present Aryan conquerors rule it from London and are not colonisers." The decadance of nations has been assigned to many causes, most of which are most properly results of the decay. The chief one appears to

be that a civilisation comes to an end because the people who created it perish from climatic unfitness. While the blond type of mankind requires for its evolution a cold, dark, northern country, the brunette of various degrees of intensity up to absolute blackness is alone adapted for lasting existence in most regions of the world.

Dealing as it does with the injurious as well as the beneficial effects of light, many subsidiary questions crop up in course of consideration. Thus it is shown that residence in dark even underground houses is much less harmful than such is commonly held to be. The Irish peasant occupies a badly lighted hut, and from the cloudiness of his country he has none too much sunlight when out of doors, yet no one can deny that he is hardy and vigorous. Another valuable hint is conveyed to mothers in warning them not to expose their infants too recklessly to the sun's glare stretched out in perambulators or baby carriages, damage to the eyes being but one consequence of such an unwise practice. Moderate exposure to the solar rays is stimulating, but when children in school are set down to write, read, or work directly facing the light, or if this is permitted to pour down upon them unmitigated by blinds of the proper colour, we must not be surprised should they manifest forms of nervous disturbance as a result. It is well known that with all care expended on white children in the tropics, they begin to fade about the age of 6 or 7, and have to be sent home to England, where they soon regain good health. This tendency to droop is supposed to be due to the fact that up to that time of life they are carefully housed and protected from the light, but now begins the restless period of running about when it is practically impossible to confine them indoors. Hence they are more and more exposed to these harmful rays, and as such are most detrimental to developing cells, we can readily understand why children, for equal exposures, suffer more than adults. The observations of Dexter on school deportment are noticeable. His charts show that children behave worst on the days when humidity is least, and that there is a general improvement in conduct with increasing air moisture. The explanation seems to be that the drier the air the clearer the sky from absence of clouds, and the greater the irritation of light, while the cloudiness increases with humidity and lessens this irritation. That is, on the darkest days the children are soothed into goodness, while on the lightest days they are irritated into actual badness. The same truth is stated in another form when it is noted that the inhabitants of Tacoma, Seattle, and all that region, attribute their exuberant health, small sick and death rate, to all sorts of causes except the right one—protection from sunshine. They regard as the only drawbacks to the magnificent climate, the rains and numerous cloudy days; were they granted all the sunshine they wish, they would be as unhealthy as the Eastern cities. The curious tendency for Americans to go back to Great Britain for permanent residence when they can, implies an instinctive desire for the feeling of comfort and well-being which they experience in their ancestral home.

In these days, when the question of taxation of land values is in the air, the following apt observation is worth quoting:—"City life being suited only for those dark, swarthy people who have been city dwellers since the days of Chaldea, it is public policy to make it better suited to

the lighter brunettes who must live there, and it is also possible to shield the unsuited blonds more than we do. Wide streets and plenty of shade trees are the two necessary conditions, with here and there a park full of large trees, for we must have more shade. European cities are wakening up to the necessity, and are widening the streets, planting trees, and here and there buying up a block of houses for a park. It is a great blow to the city dwellers, particularly the blonds, to obliterate their parks and destroy their shade trees. Every park established in the city means some family preserved; every tree planted is probably a baby's life saved."

Since acclimatisation in the tropics is impossible for the native of the dark north, though residence for a time may be imperative, it is evident that rules to guide in lessening the dangers must be laid down. The author's own experience seems to have been largely drawn from service in the Philippines, a region notoriously fatal to the white man. He concludes the volume by a few pages containing excellent advice. The due choice of clothing and the selection of a proper house bulk extensively, but such items as the necessity for a siesta and the arrangement of the tour of duty are also carefully gone into. We note in particular an observation on the harmfulness of cold baths, which are stimulating to a nervous system too much stimulated already. "The Englishman accustomed to his cold bath has long ago found out that he is in far better health in India if he confines himself to the more soothing tepid or warmer baths." We cannot too cordially welcome this suggestive volume.

NOTES ON BOOKS.

Abstracts of Mr. Mayo-Robson's Bradshaw Lecture on *Cancer and its Treatment* appeared in the medical press at the time the lecture was delivered in the end of last year. We are glad now to have it in its complete form (Baillière, London, 1905), as it contains the mature opinions of an acute observer on this most important affection. We would join with the author in the hope that some of the views enunciated in his lecture "may filter through the profession to the public, and serve to convince them that until a true prophylactic for cancer is discovered they will be consulting their own interests best by seeking medical advice earlier."

The Harveian Oration, delivered by Dr. Richard Caton in 1904, has been issued in book form. It furnishes interesting reading both to the medical archæologist and to the work-a-day practitioner. The first section deals with the "Egyptian God of Medicine—Imhotep," and the earliest inquiries known to have been made concerning the circulation and circulatory diseases by the physicians of ancient Egypt. The second, and much the shorter section, is a plea for the preventive treatment of valvular disease by prolonged rest.

Great advances have been made within recent years in the methods of examining the interior of the œsophagus and the air passages by

means of endoscopy. In the small work before us—*Trachéo-bronchoscopie et Œsophagoscopie* (J. B. Baillière et fils, Paris, 1905)—Dr. Guisez has presented us with a most readable résumé of what has been done in this direction. These procedures are destined to play an important part both in diagnosis and treatment, and Dr. Guisez, who was the first in France to perform tracheo-bronchoscopy, has done much to simplify the technique.

The Surgical Treatment of Facial Neuralgia, by Mr. J. Hutchinson, jun. (John Bale, Sons, & Daniellsen, Limited, London, 1905), deals chiefly with the epileptiform variety of neuralgia. After a brief but admirably clear description of the course and symptoms of the disease, the author deals at greater length with its causation and pathology, only to conclude, however, that these "are practically unknown." In the chapters on treatment the various operative procedures which have been carried out are fully described and well illustrated. No surgeon about to undertake the operation for the removal of the Gasserian ganglion should fail to consult Mr. Hutchinson's work. A useful bibliography is appended.

We are pleased to be able to chronicle the appearance of a fourth edition of Dr. R. W. Burnet's *Foods and Dietaries* (Charles Griffin & Co., Limited, London, 1905). Under each disease are given not only the principles on which a dietary is to be selected, but also a detailed menu, with modifications and variations, appropriate to different cases. A somewhat long appendix is devoted to sickroom cookery; and a full index renders the work easy of reference.

A useful little work on the *Elements of Anatomy and Physiology* has been written by Dr. W. Bernard Secretan (Scientific Press, Limited, London, 1905). The text is simple, and the illustrations clear and instructive.

Despite its somewhat ambiguous title, Dr. Sequeira's *Elementary Treatise on the Light Treatment for Nurses* (Scientific Press, Limited, London, 1905) will be welcomed by those to whom it is addressed. The construction of the apparatus, and the methods of employing it, the nurse can only learn in the electrical department of the hospital, but the principles underlying the procedure must be explained elsewhere, and in this short work they are clearly set forth.

We welcome the new edition of *Practical Nursing* (Wm. Blackwood & Sons, Edinburgh, 1905) by Miss Isla Stewart and Dr. Herbert E. Cuff. It is one of the best guides to place in the hands of nurse with which we are acquainted.

The fourth edition of this excellent work on the diseases of women (*Diseases of Women*, by J. Bland Sutton and A. E. Giles. London: Rebman, Ltd.) contains much that is new. This is specially noticeable in the chapters dealing with extra-uterine pregnancy, fibroid tumours, and carcinoma of the uterus, which have all practically been rewritten. We believe that the authors in a future edition might with advantage omit illustrations of surgical instruments and appliances, and retain such

plates as those of hysterectomy included in previous editions. The main features of the book remain as before, and its teaching may be taken as a sound guide to the subject with which it deals.

The author has endeavoured to overcome the obstacles associated with the teaching of operative gynecology by the publication of this atlas (*Atlas and Epitome of Operative Gynecology*, by Dr. Oskar Schaeffer. Philadelphia and London: Saunders). We think he has succeeded fairly well in accomplishing a difficult task. Perineorrhaphy, for example, an operation always difficult to make clear by diagrams, is admirably illustrated. The convenient size of the book has the disadvantage of preventing the description and the plate being on the same page. Professor Webster has done his work well, and we agree with all his editorial remarks.

This volume of the *Transactions of the American Gynecological Society* (Philadelphia: W. J. Dornan) maintains the excellence of its predecessors. It contains many articles of great interest. Perhaps the most outstanding are those on renal decapsulation for puerperal eclampsia, fibroid tumours complicating pregnancy, and on the question of removing the uterus in suppurative diseases of the appendages.

So many editions of this popular text-book—Halliburton's *Handbook of Physiology*, sixth edition (John Murray, London)—have been reviewed in these columns, that it is quite unnecessary to enter into detail as to the characteristic features of the work. The author recognises that, in order to supply the needs of students, a text-book is required which covers all the ground gone over by teachers of physiology in the schools of this country, and this is undoubtedly the reason why English work occupies such a prominent position in its pages. The author will undoubtedly recognise that certain sections, for example the chemical, might be improved by introducing new matter, but in all probability feels that such additions would not render the book more useful to students entering for examination.

This book—Brubaker's *Text-Book of Human Physiology* (Rebman, London, 1904)—presents no particularly original features. Perhaps rather more attention is paid to the anatomical side of physiology than is customary in works of the kind. Its figures are taken from a vast number of text-books, and are very clearly reproduced. It is a text-book, however, which we should imagine will encounter much difficulty in securing a firm position in this country, not because it is in any way a weak book, but simply because there are so many well established text-books already in possession of the field.

The early appearance of a second edition of Dr. Arthur Latham's *Pulmonary Consumption* (Baillière, London, 1905) is a clear indication that it has proved of value to the profession. The author has a pleasing and simple style, and the chapters dealing with the various forms of pulmonary phthisis are excellent, while the points given for differential diagnosis are exceedingly clear and helpful.

The later chapters deal in considerable detail with sanatorium treatment, both as regards methods and results. A chapter is devoted to

discussing the home treatment of consumption, but we agree with the author that whenever possible, a certain period should be spent in a sanatorium in order that the patient should be educated in carrying out the treatment.

The Open-Air Treatment of Pulmonary Tuberculosis, by F. W. Burton-Fanning, M.D. (Cassell & Company Limited, London, 1905), should prove useful to those interested in the open-air treatment of pulmonary tuberculosis. The author lays special stress upon the importance of early diagnosis, and emphasises the necessity for systematic observations of temperature and pulse in doubtful cases where physical signs are few or absent.

The second half of the book gives a brief but excellent account of the details of sanatorium treatment, giving particulars about diet, rest, exercise, shelters, etc. We can heartily recommend this little book to busy practitioners who wish to know what types of cases are suitable for treatment in a sanatorium, and what results may be hoped for, from their sojourn there.

Surgical Notes, by Nicholas Senn, is a collection of letters originally printed in *American Medicine*. They have all the interest of letters from abroad—an added interest to us because written by a medical man to medical readers—and a further personal interest to the friends and pupils of the writer. Each letter is in itself complete, and gives a short account of the surgeons, the hospitals, and the things medical of the town it is dated from. Some also contain clinical notes of illustrative cases.

Although avowedly intended "for my friends at home and abroad," to those who are interested in the wider medical world, the book is well worth reading.

The logical arrangement of Dr. W. Williams' Milroy Lectures (1904) on *Deaths in Childbed: A Preventible Mortality* (H. K. Lewis, London, 1904), is perfect. A formidable array of figures and facts is stated, sifted, and classified in a masterly way. The reasoning is close and impartial, and the conclusions incontrovertible.

Dr. Allen's Aids to Sanitary Science (Baillière, London) will be welcomed by D. P. H. students, as a useful condensation, within the coverings of one book of matter usually acquired from several text-books. It will prove useful for revisal just before an examination, and is written in a taking style, concise and lucid.

Amateur photographers will find Wellcome's *Photographic Exposure Record* most useful (Burroughs, Wellcome, & Company, London, 1905). In the form of a small pocket-book, it contains, in addition to the ruled pages for both negative and positive exposures, a vast amount of valuable information on matters photographic.

This book—*Lectures on Clinical Surgery*, by H. C. Hinder, M.B., M.Ch. (Baillière, London)—consists of an interesting series of short

articles, chiefly on genito-urinary subjects, based on clinical lectures delivered by the author to students in Sydney. The cystoscope he regards as ranking in importance with the ophthalmoscope and laryngoscope. Although admitting fully the value in some cases of the segregator and of catheterisation of the ureters, he does not regard them as generally adding very much to the information which an experienced surgeon can gain by means of the cystoscope alone. One naturally turns with interest to his lectures on senile "hypertrophy" of the prostate. He strongly advocates early operative interference, and considers the passage of a catheter in an old man, or catheter life with its septic sequelæ, to be more dangerous than operation. On the vexed question as to what is removed in a "complete" prostatectomy, he believes that, in many cases at least, only the sheath of pelvic fascia is left. He prefers suprapubic to perineal prostatectomy, but in cases of moderate enlargement has found the Bottini operation safe and satisfactory. As regards renal surgery, he strongly opposes nephrectomy in suppuration or cystic distension, however little kidney tissue may appear to be left, but advises it in even the earliest cases of tubercular disease. In nephropexy he partially decapsulates the kidney. In appendicitis he emphatically asserts that operation, as soon as the condition is diagnosed, is the safest treatment. One may note that the author seems to have been unfortunate in his experience of the Sprengel pump for bladder drainage, and that Syme's external urethrotomy is not described as Syme himself performed it.

From its origin in lectures, the book necessarily contains a good deal of conventional information, but is always readable and interesting.

Dental Surgery, by A. W. Barrett, M.B. (Lond.) (H. K. Lewis, London), is treated from the standpoint of the medical not of the dental student. Gold filling, artificial teeth, and other branches beyond the scope of the medical practitioner, receive, therefore, merely a passing reference. The structure of the teeth, the two dentitions and their abnormalities, dental caries, toothache, fractures of the maxillæ, extraction of teeth, and the use of anæsthetics, are all dealt with in a short and simple manner. The little book should be useful to the medical practitioner, especially in the country, in whose work dental first aid occupies a not unimportant place.

It is very doubtful whether there is any demand for a small book of this nature—*Diagnosis and Treatment of some of the Common Diseases of the Rectum and Anus*, by Cecil H. Leaf, M.B (Cantab) (Constable & Co., London). It is not written on a plan which makes it a suitable text-book for a student reading for examinations; while the medical practitioner, for whom it is avowedly published, will probably be of the opinion that a quite unnecessary proportion of the 118 pages is occupied by a re-statement of elementary facts. It is, however, essentially practical, and may therefore be of value to the medical man in the early days of his practice.

The sixth edition of Mr. Richard Barwell's *Lateral Curvature of the Spine* (Baillière, London, 1905) is to a large extent a new work. The

author's main thesis is that, in the vast majority of cases, the real origin of the malformation lies in a deviation of the pelvis, and, in discussing the treatment, he describes methods which are designed to eliminate this cause, and so to remedy the evil. Mr. Barwell's arguments appear to us to be sound, but his mode of expressing them is not always clear. The illustrations, however, materially aid him in elucidating his points.

Sir William Bennett has reprinted a clinical lecture on *Recurrent Effusion into the Knee Joint after Injury* (Longmans, Green, & Co., London, 1905), which has already appeared in the pages of the *Lancet*. There are few clinical lectures which merit the dignity of being reproduced in book form, and we scarcely feel that it is one of the elect.

We cannot recommend Dr. F. R. Griffith's *Handbook of Surgery* (W. B. Saunders & Co., Philadelphia, 1904) either to the students or to the practitioners to whom it is addressed. The following complete paragraph, taken at random, favourably illustrates the scope and style of the work: "*Symptoms* (of spinal curvature).—Falling of one shoulder or growing out of one scapula (winging), projection of the opposite ilium. Pain in the back and shoulder (manifested when sitting or lying down). Deviation in the normal line of the vertebræ."

To say that the twenty-third issue of the *Medical Annual* (John Wright & Co., Bristol, 1905) maintains the standard of excellence set by its predecessors is sufficient to commend it.

RECENT ADVANCES IN MEDICAL SCIENCE.

MEDICINE.

UNDER THE CHARGE OF

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Infantilism, Dwarfism, Giantism, etc.

The various affections of growth comprised under the terms dwarfism, giantism, infantilism, etc., are of such comparative rarity that any one observer's experience of them must be relatively small. Many of the papers which from time to time appear on these and allied subjects deal with but one or two cases or aspects of the condition, and for this reason it is desirable now and again to take stock of facts, as in the following review of some of the articles and notes which have appeared within the past year or so.

Hegar's paper on "Fœtalism and Infantilism" (*München. med. Wchnschr.*, 1905, April 18) is interesting in that it is one of the few dealing with the matter from the obstetrician's standpoint. He does not, as will be seen, discuss the various types of infantilism, but deals with the question as a whole. Development, he points out, comprehends both progressive change in structure and increase in size and weight. Either of these may fail while the other proceeds: a fully grown uterus bicornis is an instance of retarded evolution; a dwarf, of delay in growth. He applies the term fœtalism to all forms of backward development in children or adults which arise during intra-uterine life, *e.g.*, such pelvic anomalies as spondylolisthesis, and ovarian hypoplasia and malposition. With this we may compare infantilism, which consists in the retention of the characteristics of childhood during and after adolescence. It is not always easy to say which of these is present—often, indeed, both are combined. The causes of infantilism are manifold: hereditary and fœtal tendencies; malnutrition in infancy; infectious diseases, especially tubercle and syphilis; and thyroid inadequacy. Infantilism of the female reproductive organs shows itself in the hypoplastic uterus with the conical cervix, prolapse of the ovaries, and a justo-minor or male pelvis; the mammæ are also ill developed. Amenorrhœa, or late appearance of the menses, is not uncommon; the

periods are short and irregular, and premature menopause is not infrequent. Menstruation, however, does not entirely depend on the development of the uterus. Such persons are often sterile; but it is rash to prophesy the course of events, since marriage may favour the growth of an ill-developed uterus. Infantilism, however, is practically never limited to one set of structures. The stature is usually below the average, the skeleton small, and the cranium often deformed. The jaws, especially the lower, are hypoplastic, and the chin recedes slightly; the teeth may be narrow and irregularly set, sometimes widely apart. Gothic palate is common. Imperfect development of the cartilage of the first rib, leading to narrowing of the upper part of the thorax and predisposition to phthisis, has been described. The lumbar concavity is ill developed, and the sacrum slopes unduly. In Hertoghe's view, infantilism is due to thyroid inadequacy; the ossification of the epiphysial lines is delayed, and accordingly the bones may go on increasing in length until a stature above normal is reached. Hypoplasia of the heart and large vessels may occur; malposition of the kidneys is not rare; while amongst other developmental anomalies, those of the nervous system rank high in importance. These show themselves by a liability to neuroses, and by that subnormal intellectual and moral capacity (*minderwertigkeit*) which often gives rise in forensic cases to the question of responsibility. The rest of the paper deals with the relation of infantilism to gynæcological operations.

Gilbert and Rathery ("Mitral Dwarfism," *Arch. gén. de méd.*, Paris, 1904, March 1) point out that the clinical syndroma comprehended by the word infantilism is gradually being subdivided into types: that due to thyroid insufficiency (Broca, Hertoghe), the anangioplastic form, and others. While a sufferer from dysthyroidism remains infantile to a degree proportionate to his age at the onset of his malady, the anangioplastic cases (corresponding pretty closely with the variety of infantilism called the "type Lorain") are not really infantile, but adults in miniature, with small bones and slender, weakly frames. Of the two types, that due to dysthyroidism is the better marked; Lorain's type is much less homogeneous. It is composed of all the cases due to interference with nutrition—rickets, hereditary syphilis, tuberculosis, malaria, biliary cirrhosis, chronic icterus, family cholæmia (Gilbert and Fournier), alcohol, and cardiac affections. Among these causes of dystrophic infantilism, obstructive cardiac lesions, particularly of the mitral valve, play an important rôle. Gilbert and Rathery have isolated an affection of growth due solely to narrowing of the mitral orifice obstructing the blood supply to the body generally: this they call "Mitral Dwarfism." It is not infantilism in the strict sense, since, despite the infantile aspect of the patients, the reproductive functions are often normal. The dystrophy caused by the defective blood supply may be uniform; more commonly, however, some organs or functions bear the brunt of it. (1) The growth, chiefly, may be affected, the relative proportions of the head, trunk, and limbs remaining those of a child; sometimes the feminine type of figure is found. Premature ossification of the epiphyses is comparatively frequent, and, if present, differentiates this from myxœdematous infantilism. (2) Congenital malformations may be found. (3) Sometimes the hypoplasia affects mainly the viscera; in

the case of the genital organs there is true infantilism; if the thyroid be affected, a mixed type—anangioplastic and myxœdematous—results.

Pierre Marie and Leri (*Bull. Soc. méd. d. hôp. de Paris*, 1904, March 24) draw attention to the frequency with which *infantilism occurs among sufferers from Pott's disease*. It is shown by soft, delicate skin, absence of axillary and pubic hair, small larynx, high-pitched voice, and childish demeanour. Sometimes the reproductive organs are comparatively well developed without there being any sexual appetite. The infantilism of Pott's disease has nothing to do with dwarfism; many of the cases are short on account of the kyphosis, but the limbs are of normal length. The skull is often abnormally small. The infantilism in Pott's disease is not due to tubercle, nor to defective development of the sexual organs, or affection of the heart, such as might be caused by lesion of the lumbar cord or by dorsal kyphosis respectively. The thyroid function is normal. The only special causal circumstance seems to be that Pott's disease is much more likely to cause infantilism when it occurs in very early life than at a later period.

Moreau's case of *hereditary syphilitic partial dwarfism* (*Lyon méd.*, 1904, January 31) illustrates the defective growth of bone sometimes caused by syphilis. In a lad of 18 the right arm was found to be 5 cms., and the left leg 11·5 cms., shorter than its fellow. There were no other abnormalities. Radiographs showed that the defective growth was due to gummatous peri-stitis of, and deposit on, the upper end of the humerus and the lower end of the femur.

Ferrannini (*Arch. f. Psychiat.*, Berlin, 1904, Bd. xxxviii. Heft 1), writing on *infantilism unrelated to the thyroid*, expresses views similar to those quoted from Gilbert on the symptomatic nature of Lorain's type of infantilism. In a case of mitral dwarfism he found that the metabolism, on the whole, corresponded with a less age than that of the patient.

Helmhold, discussing *dwarfed growth in general* (*Berl. klin. Wchnschr.*, 1905, January 30), gives the limits at which dwarfing may be spoken of as from 41 to 45 in., but does not regard measurement as practically useful, since it is not merely stature, but the pathological whole, which goes to make a dwarf. He divides dwarfs into five categories: (1) *True dwarfs*, in whom no abnormality of the skeleton, as to ossification or otherwise, can be detected. These are very rare, and are seldom so small as to come within the above limit of size. (2) *Infantile dwarfs*, in whom the development of the skeleton is arrested at some period of childhood, so that the proportions of the child are retained. In these the finger tips reach the lower third of the thigh, as in a child, and the epiphysial cartilages persist. (3) *Achondroplasic dwarfs.*—The tips of the fingers may not reach below the trochanters,—a misproportion seen in no other form of dwarfing. (4) *Cretinous dwarfs.*—In these the epiphysial ossification is much delayed, but fusion ultimately occurs. All the epiphysial cartilages never persist into advanced age, as may be the case in true [*sic* (?) infantile] dwarfs. The finger-tips reach to about the level of the trochanters. (5) *Rickety dwarfs*, of three classes so far as pelvic deformity is concerned—(*a*) dwarfing predominates over deformity; (*b*) dwarfing with decided bending of bones; (*c*) extreme deformity and dwarfing (pseudo-osteomalacia).

The relationship of giantism and acromegaly still remains unsettled; the trend of opinion, however, seems to be that they are the same morbid process occurring at different periods of life: in young people the unknown cause produces giants; in older, acromegaly. The question is further complicated by the fact that apparently *giantism*, *acromegaly*, and *infantilism* may coexist, as in Launois and Pierre Roy's celebrated case, recorded in 1902 (*Nouv. Iconogr. de la Salpêtr.*), which is still the subject of discussion. These writers concluded that giantism is the acromegaly of subjects whose epiphysial cartilages are not ossified, whatever be their age. Their case was gigantic, infantile in respect of absence of genital development and secondary sexual characters, and persistence of the epiphysial cartilages, and showed some signs of acromegaly—enlargement of the lower jaw. Béclère (*Presse méd.*, Paris, 1903, December 12) gives the *radio-diagnostic signs of acromegaly* as—(1) irregular thickening of the cranial bones, (2) abnormal development of the frontal sinuses, and (3) enlargement of the sella turcica. He found indications of these in Launois and Roy's patient, and supports their view that he had commencing acromegaly. "Giantism and Infantilism" is also the title of a paper by Pagniez (*Presse méd.*, Paris, 1904, December 21), in which it is stated that stature above normal may be associated with a boyish face and mind, absence of beard, and rudimentary generative organs. Further, a case of this kind may pass through three stages: infantilism, with persistence of the epiphysial lines; rapid growth, producing a giant; finally, cessation of growth, with fusion of the epiphyses and the occurrence of the features of typical acromegaly.

Variot (*Gaz. d. hôp.*, Paris, 1905, February 2) has made comparison between the Röntgen photographs of the hands of normal children, cases of rickets, and cases of malnutrition. To put the matter shortly, he finds that the centres of ossification appear at the same age in rickets as in health, while in malnutrition (*hypotrophie*, due to infantile atrophy and poisons absorbed from the intestine) they are delayed by about a year.

Hastings Guilford's work on retarded growth is so well known that a short reference to his latest paper (*Brit. Med. Journ.*, London, 1904, October 8) is sufficient. He has appropriately named two almost antithetical conditions *progeria* and *ateleiosis;* the former is premature senility, the latter arrested development, and both have a quite characteristic physiognomy. Ateleiosis is a form of dwarfism distinct from any mentioned; it occurs in an asexual and a sexual variety, according to whether the reproductive organs remain undeveloped, or whether puberty occurs, the epiphyses fuse, and the individual presents the stature, physiognomy, and proportions of the child, along with all the other signs of maturity. *Asexual ateleiosis* is a disease *sui generis*, which may begin before birth, in infancy, or later; though a form of infantilism, the subjects, therefore, are not necessarily dwarfs. While development is backward all round, it is not uniformly so; thus in one case, aged 12, the genital organs resembled those at birth, the proportions of the limbs those of a child of 3, and the ossification that of a boy of 7. Sexual ateleiosis, of which General Tom Thumb was an instance, differs from the preceding in being more frequently

hereditary, and in the appearance of puberty with a corresponding muscular development. Though the epiphyses fuse naturally, there is scarcely any of the growth in length of the bones which is so characteristic of normal adolescence. Of *progeria* only two well-marked instances have been recorded. Its signs fall into three categories—(1) Premature ageing—leanness and wrinkling, baldness, atheroma, and fibrotic changes in the viscera. (2) Delayed development—stature and proportions of childhood and backward dentition. (3) Normal growth—sexual organs, cartilage bone, and brain.

SURGERY.

UNDER THE CHARGE OF

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On the Mosetig-Moorhof Method of filling Bone Cavities.

Elsberg (*Med. News*, New York, 1905, April 15, p. 683) expresses a favourable opinion of Mosetig-Moorhof's method of filling bone cavities with iodoform wax, and, as a result of his experience, he has modified the procedure in certain details. The operation is suitable to cases of chronic osteomyelitis, whether pyogenic or tuberculous in origin, only when the cavities to be filled in, as well as the surrounding soft parts, can be rendered aseptic. The limb is prepared as for any operation, and is rendered bloodless by means of an Esmarch's bandage. The bone cavity is then freely exposed by raising the soft parts, including the periosteum, over it. The walls are then scraped or gouged away until a fresh, vascular, and sterile surface is exposed. The walls of sinuses are excised, and all infected tissues removed from the vicinity. Elsberg thinks that at this stage the Esmarch's bandage should be removed, in order that the bleeding from the rawed surfaces may be completely arrested before the iodoform-wax mixture is introduced. He has found irrigation with hot saline solution, irrigation with peroxide of hydrogen, and packing with adrenalin and dry sterilised gauze, efficient in arresting the bleeding. The mixture used by Mosetig Moorhof consists of 60 parts of iodoform, 40 parts of spermaceti, and 40 parts of sesame oil. It is prepared by beating the spermaceti and the oil of sesame over a water-bath for half an hour, then adding the iodoform to it, and preserving the mixture in a sterilised bottle. When it is to be used, the mixture is melted by immersing the bottle in hot water, and it is poured, while still fluid, into the cavity. Elsberg only used 20 per cent. of iodoform, as he had one case of iodoform poisoning from the stronger mixture, and in place of pouring the fluid mixture directly into the cavity, he cools it in a basin of sterilised cold water, till it is of about the consistence of putty, and then packs it tightly into the cavity in the same way as a dentist fills a cavity in a tooth with cement. After this has been done, the soft parts are, if possible, brought together, and the wound is

dressed with an ordinary aseptic dressing, which is not disturbed for from seven to ten days. Primary union generally takes place. In some cases there is a slight rise of temperature and pulse rate for two or three days, and a small quantity of iodine is usually present in the urine for a day or two. The patient almost always complains of a burning sensation in the wound for a few days. If the operation is successful, the patient's stay in hospital is materially shortened. Even if the filling is extruded, the healing process seems to be hastened.

A Method of inducing Ether Narcosis by Rectum.

The idea of administering ether by the rectum for purposes of surgical anæsthesia has recently been revived. J. H. Cunningham and F. H. Lakey (*Boston Med. and S. Journ*, 1905, April 20, p. 440) record their experience of forty-one cases. The apparatus used by them consists of a bottle the body of which is 7½ in. in height, 5 in. being used for ether space and 2½ in. for vapour space. The bottle contains about 29 oz. of ether. This bottle stands in a water-bath at a temperature of between 80° and 90° F. An afferent tube leads to the bottom of the ether column, and through it air is pumped into the bottle. The efferent tube passes to the rectum and ends in a stiff rectal tube, which is introduced into the bowel for a distance of from 10 to 14 in. The ether vapour is forced into the gut by squeezing the bulb every five or ten seconds. In from one to five minutes of commencing the administration the breath becomes ether laden, the patient gradually becomes drowsy, the breathing stertorous, and he gradually passes into a state of complete surgical anæsthesia, without any stage of excitement. The same signs regarding the patient's condition guide the anæsthetist as in administering ether by inhalation. The writers summarise their experience thus: There is comparatively little ether used; there is no stage of excitement; vomiting seldom occurs; bronchial secretions are absent; there is comparatively quick recovery from the effects of the anæsthesia; the bowels are slightly constipated. They have not met with diarrhœa or melæna after administering the drug in this way. They suggest that the method is specially suitable in operations about the head, mouth, and neck, as the anæsthetist does not come in the way of the operator. This, we confess, is the only advantage which appeals to us strongly.

The Surgery of the Prostate Gland.

No fewer than eleven different papers bearing on the surgery of the enlarged prostate appear in the April number of the *Ann. Surg.*, Phila., vol. xli. No. 4. It is impossible for us adequately to summarise these, but we commend this series of articles to those of our readers who are interested in the subject, as they embody the most advanced views of American surgeons on the various aspects of this much debated affection. On the vexed question of the "priority in the adoption of the method of total enucleation" by the suprapubic route, Dr. Eugene Fuller enters an emphatic protest against the claims of Mr. P. J. Freyer, whose reply we await with considerable interest. In this connection it is pleasing to note that the pioneer work of the late Mr. M'Gill of Leeds receives

due recognition from several of the American authors. With regard to the complete removal of the gland by the perineal route, Dr. Francis S. Watson recalls that as early as 1873 Dr. Gouley of New York published a description of this operation.

To the question "Has the catheter a place in the treatment of chronic prostatic hypertrophy?" Dr. Paul Thorndike gives a decided answer in the affirmative, and he indicates with convincing clearness his reasons for refusing to discard the catheter in certain cases. On the other hand, Dr. F. F. Watson asserts, with all the emphasis which italics afford, that "the really essential point for those who are experts in this special province is to bring home the fact to the profession at large, that the operative treatment of prostatic hypertrophy has been brought to a sufficient degree of perfection to make it evident that the patients should be given the benefit of it, and should not be submitted to the dangers of catheterism as they have been in the past, until it is hopeless to interfere surgically in many instances." "The mortality," he says, "attending the catheter treatment was even greater, except in the class of people of the best social status, than that attending prostatectomy, and the mortality of perineal prostatectomy, were it practised at a sufficiently early stage of the progress of the malady, would certainly prove to be far less than that associated with the catheter treatment, in all classes of persons."

Regarding the relative merits of the suprapubic and perineal routes, Dr. Howard Lilienthal says, "I believe that the suprapubic is the safest and most thorough of all the operations for the relief of prostatic obstruction;" and he expresses his opinion that the "two-stage method" —meaning by that the opening of the bladder at one sitting, and the enucleation of the prostate later—to be one of the important advantages of the suprapubic route. This modification is specially indicated when the urine is septic, as the suprapubic opening admits of the bladder being drained, the state of the urine being improved before the prostate is removed. In a number of his cases sexual power was increased after the operation, and in none who were potent before was it lost. As an internal urinary antiseptic he prefers salol, in 5-gr. doses, taken three times a day. Dr. Joseph Weiner, jun., also prefers the suprapubic route, and he performs the operation under nitrous oxide anæsthesia, even in the most desperate cases.

The superior claims of the perineal route are urged by Dr. Hugh H. Young, who says, "I have come to the conclusion that for most cases perineal prostatectomy is the safest and surest and quickest method of curing the patient." This surgeon found that in the majority of cases the sexual power has been maintained after the operation. Dr. Lewis S. Pilcher and Dr. F. W. Watson also support the perineal operation.

In a most interesting paper, Dr. Charles H. Chetwood deals with the subject of "Prostatism without Enlargement of the Prostate" (see also *Edin. Med. Journ.*, 1905, March, p. 310)—a morbid condition which, he thinks, is best expressed under the title of "Contracture of the neck of the bladder." "It is," he says, "a fibroid stenosis of the vesical orifice. It is not a hyperplasia of the muscular elements of the sphincter, or of the adenomatous tissue; it is not a simple spasm or a mucous fold; but a fibrous infiltration, inflammatory in character." From an experience

of thirty-six cases, he concludes that the relief of the condition is safe and sure by means of a galvano-prostatotomy through a perineal opening.

OBSTETRICS AND GYNÆCOLOGY.

UNDER THE CHARGE OF

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Rupture of the Lateral Walls of the Vagina during Labour.

Lutaud (*Journ. de méd. de Paris*, 1905, February) refers to the frequency of rupture of the vaginal wall, the fourchette remaining intact. He found in 115 cases thirty-two with lateral vaginal tears, and in forty-nine cases combined with perineal tears. The prognosis is good, the wounds heal without suture, and the cicatrix may be of medico-legal importance as an aid to the diagnosis of a previous pregnancy.

Post-partum Psychoses.

Picqué (*Bull. Soc. d'obst. de Paris*, No. 1, 1905) distinguishes cases arising directly after confinement, and those manifesting themselves later. The former are nearly always associated with fever; the latter are, as a rule, apyretic. In the later, Picqué thinks mental degeneracy is often a predisposing factor. Many cases he found to be associated with morbid conditions of the uterus. Thus polypoid degeneration of the mucosa—ulceration of the cervix—he noticed especially frequent. In nine cases out of fourteen the mental affection improved, in six was completely cured, after local treatment. In no case was the mental condition made worse by surgical interference.

The Prophylactic Use of Ergot during Labour.

Prüsmann (*München. med. Wchnschr.*, 1905, January) recommends a 15 per cent. aqueous solution of ergotin, with a few drops of carbolic added. He injects 2 to 4 c.c. into the gluteal region in the following cases:—(1) Spontaneous birth, when the head is almost born; (2) in forceps cases, when the instruments are applied; (3) in breech cases. In cases of Cæsarean section, 2 to 3 c.c. are given ten minutes before operation. The following are the indications for the use of ergot given by Prüsmann:—(1) All births requiring operative interference; (2) multiple births; (3) hydramnion; (4) fibroid tumours of uterus; (5) inefficient labour pains. In 293 cases delivered with forceps,

haemorrhage occurred in only three cases; and in 102 plural births there was only one case of atonic bleeding.

Digital Dilatation of the Cervix.

Koppe (*Centralbl. f. Gynäk.*, Leipzig, 1904, November 12) recommends this method in preference to instrumental dilatation. He introduces three fingers of the left hand into the cervix, after partially dilating the cervix; the introduction of the index and middle fingers of the right hand complete the dilatation. Koppe regards this method as much safer than instrumental dilatation.

The Induction of Premature Labour for Puerperal Psychoses.

Pick (*Wien. med. Wchnschr.*, 1905, No. 2) considers that this question is not yet clearly decided. He does not agree with the general opinion that no improvement in the mental condition is produced by the induction of abortion, and quotes cases proving that actual cure may occur after the interruption of pregnancy. He argues, however, that great discrimination is necessary in choosing suitable cases.

Partial Contractions of the Uterus, and their Importance in Diagnosis.

Bar (*Bull. Soc. Obst. de Paris*, 1905, February) believes that during the later months of pregnancy certain segments of the uterus contract, while others remain relaxed, the former giving the sensation on examination of tumour growth. Difficulty may arise in differentiating this condition from extra-uterine gestation or myoma. Such partial uterine contractions may be very painful, and correspond to what occurs in animals with bicornuate uteri, where one side of the uterus contracts, the other remaining relaxed.

Rupture of the Uterus.

Valenta (*Centralbl. f. Gynäk.*, Leipzig, 1905, March 4) gives the results of sixteen cases occurring in 1350 labours. There were fourteen cases of complete rupture, two partial, with five recoveries. Of the former, eight were treated by operation, with three recoveries; three were *in extremis* when first seen; and three declined operation. The best results are got when operation is done as soon as possible after rupture has occurred. All cases not operated on died. In five cases the operation was supravaginal hysterectomy, with extra-peritoneal treatment of the stump. Valenta prefers this to total extirpation, as the operation is easier, quicker, and there is less danger of sepsis. The two cases of partial rupture recovered after suture of the wound.

Tetany in Pregnancy.

Volker (*Monatschr. f. Geburtsh. u. Gynäk.*, Berlin, Bd. xix. Heft 1) reports a case occurring in five consecutive pregnancies:—P., æt. 39,

5-para. The attacks of tetany began in the fingers of the right hand, and then extended to the right and left arm and face. They occurred at intervals of about a week, ceased after labour, and recurred with succeeding pregnancies. Chloral hydrate and bromides had no effect in preventing the attacks.

Puerperal Tetanus.

Lop (*Bull. Soc. d'obst. de Paris*, 1904, No. 2) reports a case occurring thirty-two days after labour, induced at the eighth month on account of albuminuria in twin pregnancy. There was no visible wound of the vagina, vulva, or other parts of the body. The infection probably occurred through the uterus. Death occurred in three days.

THERAPEUTICS.

UNDER THE CHARGE OF

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On the Therapeutic Value of the Antitoxin contained in Antidiphtheritic Serum.

Cruveilhier raises an interesting point regarding the value of the present method of standardising antidiphtheritic serum. He points out, in addition to the antitoxin, various other substances—agglutinin, sensibilisatrix; and others of an antimicrobial action have been recognised in the serum. Our present method of standardising the serum only takes into account the number of antitoxic units present, and that serum which contains the greatest number of units is supposed to be the most powerful remedy. By a series of comparative experiments with sera containing different values of antitoxic units, Cruveilhier shows that this supposition is not strictly warranted. In many instances a serum containing only 200 units proved more efficacious as a prophylactic than one containing 500 units. Similarly, in curative experiments, the weaker serum gave equally good or even better results. The author, therefore, concludes that the curative effect of a serum does not depend exclusively on its value in antitoxic units. The estimation of the value of the serum as carried out at present does not suffice to give us an exact estimate of the efficacy of a serum. This could be most satisfactorily measured by the actual therapeutic power.—*Ann. de l'Inst. Pasteur*, Paris, 1905, No. 4.

Gelatin Solution in Aneurysm.

Dentu reports a case of traumatic aneurysm of the popliteal artery which cured completely under gelatin injections. From the situation of the lesion operative interference was impossible, owing to the risk of producing gangrene, as it would have been necessary to ligature the posterior tibial, peroneal, and probably also the anterior tibial and popliteal arteries. Flexion was impossible except to a very slight degree, and after a month was found to have had almost no effect. Gelatin solution to the amount of 200 c.c. of 2 per cent. strength was injected on six occasions, at intervals of five, seven, eight, and twelve days. At first it caused a slight febrile reaction, but the tumour rapidly subsided and became hard, while pulsation ceased. Six injections were given in forty days, and then only a small area of softness remained, and this disappeared after a further injection.—*Bull. Acad. de méd.*, Paris, 1905, No. 15.

The Internal Treatment of Gall Stones with Sodium Salicylate.

Stiller finds no drug so useful as sodium salicylate for bringing to an end a recurring cycle of biliary colic. He can look back on a series of cases where patients with constant pain, severe dyspepsia, vomiting, and inability to take nourishment were cured with a few weeks' treatment, although they had already lost a great deal of weight. Within ten to fourteen days' treatment these symptoms ceased, and the patient commenced to put on weight. His treatment is very simple. During the free intervals the drug is given in 7-grain doses four times daily. If the attacks of colic are very frequent, the patient is kept in bed till relief is obtained. Less severe cases are merely confined to the house until the liver pain disappears. For a few days at first, the diet should be very strict and of a fluid character. For attacks of colic, morphia may be injected. Even after improvement has set in, the salicylate should be continued, along with occasional linseed meal poultices over the liver, for several weeks. To intensify the action of the salicylate, a few drops (3 to 4) of tincture of belladonna may be added to each dose, with the view of relaxing any spasm. Even if the patient keeps perfectly well, he should take the salicylate for two or three weeks at a time during the course of the year, without making any alteration in diet or restricting the amount of exercise. Stiller holds that the salicylate is excreted by the bile and exerts an antiseptic, sedative action, while at the same time the flow of bile is stimulated.—*Wien. med. Wchnschr.*, 1905, No. 1, in *Centralbl. f. d. ges. Therap.*, Wien, 1905, No. 5.

Papain.

Papain is a vegetable digestive prepared from the fresh milky juice of Carica Papaya by a complicated process. Two varieties are recognised, powdered and granular papain. The former is of a light biscuit colour,

which does not darken on exposure, but the granular variety changes from a light brown to a darker shade; white preparations are bleached and are inferior in action. Papain should always be prepared from fresh juice. The crude drug begins to lose its activity after four months, but tabloids made from the fresh juice retain their activity indefinitely. The taste of papain is slightly saltish and acrid. Its odour is peculiar. Mixed with water, it has a soapy feel. It acts in an acid, alkaline or neutral solution as a solvent for albumin. Huybertsz finds it a very valuable remedy in dyspepsia. For those who were accustomed to high living, but to whom rich and savoury dishes are reduced to tantalising visions, papain is invaluable if given in doses of 1 to 3 tablets immediately after meals.—*Journ. Ceylon Br. Brit. Med. Ass.*, 1904.

The X-ray in Goitre.

Görl has discovered a new field for the X-ray. Parenchymatous goitres rapidly react to the rays. The parenchymatous cells are not deeply situated, hence the active rays can easily penetrate to them. Further, the goitre contains a large number of young abnormal cells, and we know that such cells are most readily destroyed by the rays. The best kind of tube to use is one fairly soft. It should be brought close up to the tumour to allow the maximum of active rays to penetrate. As the skin of goitrous patients seems abnormally sensitive, the exposure should not exceed eight to ten minutes at any one sitting. Görl has treated eight cases with this method. In all cases great improvement was produced. The pressure symptoms rapidly subsided, and the circumference of the tumour diminished after a short period of treatment. —*München. med. Wchnschr.*, 1905, No. 20.

The Urinary Excretion in Epileptics on Ordinary Diet, and on a Diet containing no Chlorides.

Voisin and Krantz have made an elaborate cryoscopic study of the effect of a diet containing no chlorine on the urinary eliminations of epileptics. They find that the epileptic attack corresponds to a period of intoxication, with substances either elaborated inside the organism or of heterogenous origin. This intoxication acts on the cells of the brain, and is frequently accompanied by a disordered state of the alimentary canal. When the urinary excretion has freed the organism from these toxic products, the convulsions disappear for the time being. The convulsive seizure is not, in the proper sense of the word, a critical manifestation: it is not the violent termination of a morbid development. It is rather the result of an intoxication reaching its maximum, and not the termination of that poisoning. A similar retention and elimination of toxic products is observed in other mental conditions. To determine the convulsive element of true epilepsy, possibly a particular kind or quantity of toxic elements require to be retained, or a special hereditary disposition causing a peculiar susceptibility of the nervous

cells is requisite. From the therapeutic point of view the régime without salt causes a more active elimination of these toxic products, which explains to a certain extent its good effect. Still this is not the most important factor, since to produce the best action it is necessary to associate a bromide medication along with the chloride-free regime. Further, the amelioration is most pronounced when the dechlorisation is carried out on an organism thoroughly bromised. When the patient has been for a long period without bromide or chloride, the association of bromide to the chloride-free diet does not give any better results than the simple bromide treatment with ordinary diet. This shows that the osmotic changes which accompany the change to the chloride-free diet must play an important part in the therapeutic effect.—*Arch. de méd. expér. et d'anat. path.*, Paris, 1905, No. 2.

PATHOLOGY AND BACTERIOLOGY.

UNDER THE CHARGE OF

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Natural Hæmolysins.

Mioni (*Ann. de l'Inst. Pasteur*, Paris, 1905, February 25), from a study of the serum of the ox, sheep, dog, and rabbit, concludes—(1) The red cells of the blood offer a varying resistance to the hæmolysins, some offering the greatest, some the least, and others an intermediate resistance. (2) It takes more hæmolysins to destroy a certain number of red cells of increased resistance than it does to destroy the same number possessed of diminished resistance, and within certain limits of dilution the number of red cells destroyed is proportional to the quantity of hæmolysins contained in the serum. (3) In the natural hæmolysin of the ox and dog, the complement (*l'alexine*) and the immune body (*la sensibilisatrice*) are present in the best proportions, neither being in excess. (4) In varying experimentally the relations between the immune body and the complement in natural hæmolysins, he obtained the following results:—(*a*) In the presence of an excess of immune body, hæmolysis is proportional to the quantity of complement; (*b*) in the presence of an excess of complement, hæmolysis is proportional to the quantity of immune body; (*c*) when the complement is not in excess, the hæmolytic effect can be increased by increasing the immune body up to a certain point, when the addition of more immune body diminishes it, and *vice versâ*, but this adjuvant action is less in the case of the complement than in that of the immune body.

The Biology of Certain Anærobic Germs (Intestinal) and an Easy Means for their Artificial Cultivation.

Tarozzi (*Riforma Med.*, Roma, 1905, February 11, 18, and 25, vol. xxi.) gives a long account of the biology of certain germs inhabiting the intestine of man and other animals, particularly the dog. They are difficult to cultivate, and their biological and morphological characters are imperfectly known. They are characterised by their producing a terminal spore (pseudo-tetanus) and by their being strictly anaerobic. They closely resemble germs which can be isolated from the putrefying human cadaver, and are believed to be the chief cause of the putrefaction. These germs have been cultivated by the author with great ease by sowing a little of the intestinal contents in ordinary media (bouillon, agar, etc.), and adding a small fragment of the animal's tissues under aseptic precautions. The tissues which gave the best results were the parenchymatous organs, the lymphatic glands, and the muscle, while connective tissue, tissue fluids, and the blood itself were unsuitable. It appears that the added substance is necessary for the assimilation of the germs, namely, the substances produced during disintegration. Cultivation of the germs is likewise successful in ordinary bouillon, provided that some albuminous coagulate is left in it and sterilisation is not carried out at too high a temperature (not more than 106° to 108° C.), or for too long a time. Free boiling of the media should not occur. In the dog these pseudo-tetanic bacilli are found in great numbers both in the intestine and in the mesenteric glands. In old dogs, which are apparently quite healthy, it is not rare to find them also in the liver and in the spleen. The spores of these pseudo-tetanic bacilli isolated both from the dog and from man, when injected under the skin of animals, often live for an indefinite time. The well-known bacilli of tetanus and symptomatic anthrax, considered at present to be strictly anaerobic, can often be cultivated aerobically in the same way, namely, by adding to the media a fragment of fresh tissue, and the bacilli grown in this way pursue their normal characters both as to spore formation and toxin production.

Distribution of the Germs in the Intestine of Nurslings.

Tissier has continued (*Ann. de l'Inst. Pasteur*, Paris, 1905, February 25) his work on the flora and fauna, both normal and pathological, of the intestine of the newly-born, with a view to determine what is their mode of formation and distribution in health and their modifications in digestive troubles. It is found that the number varies in different parts of the intestine; few in the stomach, they become still fewer in the duodenum and the first parts of the small intestine, but progressively increased in the ileum, the cæcum, and the rectum, where they reached their greatest number. This diminution in the duodenum is caused by its exerting a sterilising action, not active at birth, but only after twenty-four to forty-eight hours after birth, both in the dog and cat. Taking the bacteria found in the intestine from the stomach to the rectum, the following is their order—*Bacterium coli*, and *B. lactis aerogenes*, *enterococcus*, *B. exilis*, *B. acidophilus*, and *B. bifidus*. In the

stomach they are aerobic and feebly fermentative, whereas they become more anaerobic lower down, until they are strictly so in the rectum. Their fermentative action increases proportionately. It is the three causes, namely, the sterilising action of the duodenal secretions, the oxidising action, more or less pronounced, of the intestinal contents, and the varying fermentative power of the bacteria, which determine the distribution of the microbes in the intestine.

The Etiology of Smallpox.

During 1904 many papers appeared dealing with the intraprotoplasmic and intranuclear bodies found in the cells of the skin lesions in smallpox. Some of these supported the parasitic nature of these bodies, and others held that they were merely degenerative products. Two of the most important of these papers appeared in the *Journal of Medical Research*, the first, by Howard and Perkins in the October number, repeated the studies of Councilman and his associates, and supported their views that the bodies represent stages in the life cycle of a protozoon parasite. They recognise a primary and a secondary cytoplasmic, and a primary and a secondary intranuclear, stage of the parasite, and believe that it is the cause of smallpox. The second paper is by Ewing in the November number, and it reviews in detail the evidence for and against both views. He shows that the facts on the whole strongly favour the view that these bodies are products of cytoplasmic degeneration, though they are not conclusive. The most important of these facts are—(1) The specific vaccine body shows in many instances definite connections with the protoplasm of the epithelial cell. (2) There appear to be numerous transitional forms between the specific vaccine body and other homogeneous globules in the cells which can be produced by diphtheria toxin. (3) The form, size, and structure of the vaccine body are so irregular as to suggest the cycle of a degenerative process rather than that of a living protozoon. (4) Nucleus, spore formation and multiplication have not been demonstrated for the vaccine body. (9) The general history of vaccinia shows that an active, diffusible toxin similar to that of diphtheria is at work, but the production of such toxins is not characteristic of protozoa. (6) The action of vaccine on widely different animals shows that the same general process and in many respects the same intracellular changes are produced. (7) The intranuclear bodies do not give such satisfactory staining results as they would if they were protozoa, but rather behave like nucleoli and linin drops. (8) In pure variolous tracheal lesions, fixed in formalin, all the intranuclear bodies present seem clearly identical with degenerating nuclear elements. There are satisfactory transitional forms from homogeneous linin globules which have no resemblance to protozoa, up to large vacuolated bodies recognised as belonging to the cycle of the variola parasite. (9) The intranuclear rings seem to occur only at a particular stage, not initial of the necrosis of squamous epithelial cells. (10) The intranuclear cycle is imperfectly represented in specific lesions of mucous membranes, and may be entirely missing in the cutaneous necrosis of rapidly fatal secondary hæmorrhagic cases. Commenting upon all this evidence, an editorial of the *Physician and Surgeon*,

Detroit, 1904, December, says: "Ewing's paper is refreshing in its calm statement of facts and in its admirable conservatism, and sums up the whole position as follows:—In the lesions of variola there are found peculiar bodies to some extent resembling protozoa and apparently occurring in a definite series. Similar forms occur individually in other conditions. In their general morphology, staining reactions, and cytoplasmic relations, these bodies also suggest very sharply cytoplasmic degenerative products." Between these two views we stand at present, and there is no absolutely convincing proof of either. It is thought that we have got as far as we can get by the use of technical methods at present available, and that other means must be tried. The evidence at present offered is wholly morphological, and recourse should now be had to cultural methods. Something has already been done towards the cultivation of amœbæ and trypanosomata, and it should encourage cultural experiments in all conditions suspected of a protozoal parasitic causation.

DERMATOLOGY.

UNDER THE CHARGE OF

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Yaws and Syphilis.

The writings of Mr. Jonathan Hutchinson, who is a strong supporter of the identity of these diseases, have naturally attracted considerable attention. The opinion, therefore, of those physicians who have seen much of yaws in countries where it is endemic, and where syphilis is also encountered, must be regarded as of great value in deciding the question. Yaws or framboesia is very prevalent in Sumatra, not only among the indigenous inhabitants, but also among the Javanese, who have immigrated there as cultivators; and Henggeler, who has long practised there, has published (*Monatsh. f. prakt. Dermat.*, 1905, March 1) an interesting account of his observations. His description of the phenomena of yaws corresponds closely to that with which we are now well acquainted. He admits that the diagnosis between yaws and syphilis is at times difficult, and in the earlier days of his practice proved occasionally unsatisfactory to himself. The ailments have many points of contact. Both are exquisitely contagious. Framboesia, like syphilis, has two stages of incubation, one, that which precedes the appearance of the so-called "mother yaw" or primary efflorescence, the other, that before the general eruption, and the duration of these incubation stages is much the same in both diseases. Certain forms of syphilis, leaving out of view the morphology, may be deceptively like yaws, such as syphilis vegetans, another name for which is syphilis framboesiaformis. Through coalescence of the framboesic tubercles, condylomata are simulated, while the crusts which appear are not unlike those in rupia. In both, any part of the body may be affected, while the two so-termed specific medicines for syphilis, mercury and iodine, exert also a favourable influence in yaws. While these constitute

correspondences, there are many others which are opposed to the view of their identity. Yaws, in those regions where it is endemic, is a pronounced disease of children, and infection seldom, or but exceptionally, can be traced to sexual congress. Syphilis, on the contrary, most frequently attacks adults, and finds its place of entrance most commonly at the genital organs. The mother efflorescence in yaws exhibits great morphological similarity with the generalised eruption. In syphilis, on the contrary, polymorphism of the various stages is characteristic. In frambœsia there is no falling of the hair, no eye or nerve affections, the mucous membranes and internal organs remain healthy, the prognosis as regards life is favourable, and the lesions heal without leaving trace, provided there is no secondary infection of the tubercles. Syphilis very frequently invades the mucous membranes and internal organs, it occasions loss of hair, and (at least in the tertiary stage) can cause some destruction of tissue and scarring. The lymphadenitis in yaws is regional, the swollen glands are painful to pressure; while in syphilis there is general lymphadenitis, and the glands, if palpated, are not sensitive. The patient suffering from yaws is (at least at first) annoyed by very severe itching; this is always absent in syphilis. The raspberry-like daughter eruptions are typical of yaws, while this form of exanthem in syphilis is exceptional. The general health in yaws is seldom markedly interfered with, it may undergo spontaneous cure, and is not conveyed by inheritance. Syphilis always affects the health, spontaneous cure is unusual, and hereditary transmission is undisputed. Tertiary symptoms in syphilis, particularly in those not subjected to treatment, are frequent; the question of late symptoms in yaws is a contested one, and uncommon. One cannot infer much from the favourable effect of mercury and iodine as to identity or relationship. Iodine is also useful in actinomycosis (and in blastomycetic dermatitis), and we now explain the specific action of mercury in syphilis after a different manner than we did formerly. Finally, yaws is an essentially tropical disease, which is spread over country districts. Syphilis is a disease of towns, and its geographical diffusion owns no limits. The histological investigation of the eruption supports the disjunction of syphilis from yaws. Characteristic of syphilis in all stages is the implication of the vascular system, particularly the alterations in the walls of the vessels. In yaws, on the contrary, the vascular walls are intact. Dilatation of the lumina of the blood vessels, distension of the lymph spaces, which belong to the picture of frambœsia, are never, or but seldom, encountered in syphilis. The syphilitic process leaves the epidermis in general unaltered, at least in no case are the epithelial changes so constant as in yaws. The marked leukotaxis, almost without exception present in the larger frambœsia tubercules, is absent in uncomplicated syphilis. Organisation of connective tissue has by no means the prominence in yaws as in syphilis. On the other hand, we do not meet with degeneration and necrosis of the connective tissue in yaws as we do in syphilis. Lastly, according to Unna, the type of plasma cell is better maintained in yaws than in any other granuloma. The clinical and anatomical distinctive features are thus so preponderating, that we are led to the conclusion that yaws and syphilis are entirely separate diseases.

Lichen Spinulosus.

Two authors have simultaneously occupied themselves with this disease —Lewandowsky (*Arch. f. Dermat. u. Syph.*, Wien, 1905, Bd. lxxiii. Heft 2 u. 3) and Adamson (*Brit. Journ. Dermat.*, 1905, February and March). Its isolation has been ascribed to Devergie, but this seems to want verification. The eruption may be acute and extensive, or after a subacute fashion in crops. The individual elements are pinhead-sized, red or pale, conical papules, with a horny spine in the centre, one-tenth of an inch long. To the hand passed over the patch the sensation as of a file is imparted. The spine can be extracted, leaving a depression in the papule. Should the eruption have existed for some time, the red hue fades, and it assumes the colour of normal skin. The papules are arranged closely together in patches, which are often large and irregularly distributed. The most usual localities attacked are the nape of the neck, buttocks, region of the trochanters, abdomen, flexor aspect of the thighs, the ham, the extensor surface of the arms. The face, the upper portion of the chest, the hands and feet seem to remain immune. In cases where the eruption is not spread over the whole body, it shows a tendency to appear in circular groups, with isolated papules in their neighbourhood. Individual patches come out suddenly, increase during several days, then, after paling in colour, persist unchanged for an indefinite time. The affection is chiefly seen as an independent disease, yet it has been encountered in association with lichen scrofulosorum, with the small papular syphilide, and particularly with lichen planus, especially when that occurs on the legs and takes the form of lichen verrucosus. It occasions slight or no itching and hardly any annoyance, save the deposition of the separated spines on the clothes. The cause is hitherto unknown, it is met with most frequently in children, and in them mostly in boys. Many of those affected look pale, and are of weak constitution, but no connection with any internal ailment has been established. Keratosis pilaris is the complaint which comes closest to it, but here the horny spines are not nearly so pronounced; it may take on an erythematous type, but is a diffuse not a circumscribed disorder. The prognosis is good if the treatment is efficiently carried out. Untreated, it may persist indefinitely. The remedies are alkaline baths, painting on Vlemingkx solution, and the administration of tonics internally. Up till now there do not appear to have been any very careful histological examinations. Adamson summarises the appearances in his case as follows :—A horny plug distends the follicle at its upper third, and extends upwards for some distance beyond the level of the epidermis. It is made up of concentric lamellæ composed of flattened welded horny cells. There is acanthosis of the cell wall. There is an absence of keratophyalin granules, the horny cells of the plug being formed by a process of irregular cornification. No micro-organisms were discovered. The hair bulb is unaltered, but the subaceous glands are atrophied or absent. There is very slight increase in amount of cells of connective-tissue type at the neck of the follicle and in the neighbourhood of the papillary vessels. These findings, then, do not differ essentially from those of other hyperkeratoses of the pilo-sebaceous follicles. The corium showed little evidence of any pathological change. The increase of fixed cells around

the follicle and in the neighbourhood of the vessels was slight, and did not indicate any inflammatory action of importance. There were no leucocytes nor lymphocytes. He regards the process as non-inflammatory, and confined to the epidermis, consisting of a certain degree of acanthosis, with considerable hyperkeratosis. Lewandowsky, on his part, concludes that the eruption is essentially an inflammatory affection of the follicles, and that the spines are a secondary phenomenon. Its onset would suggest a parasitic origin, but this view was so far negatived by the absence of micro-organisms in sections and culturally. As in his case there were intra follicular pustules, it was not a pure instance of lichen spinulosus as encountered here.

DISEASES OF CHILDREN.

UNDER THE CHARGE OF
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Heart Affections in Scarlet Fever.

While the cardiac lesions occurring in cases of diphtheria have been carefully studied, little attention has been paid to the affections of the heart, which so frequently complicate cases of scarlet fever, and add so considerably to the gravity of the attack.

Schmoltz (*München. med. Wchnschr.*, 1904, vol. li. p. 1417), in a study of 191 cases of scarlet fever in Dresden, found signs of circulatory disturbance in 35 per cent. At the beginning of the attack the pulse is always rapid, but this does not necessarily indicate any cardiac derangement. Of much greater importance is the rate of the pulse at subsequent periods. When the temperature falls, the pulse, as a rule, returns to the normal state, but variations are observed. In some cases the rate becomes much diminished, while the temperature is still elevated. Pulses of from 55 to 58 beats a minute are not uncommon, and occasionally the pulse rate falls suddenly to from 20 to 40 beats, so that we can speak of a pulse crisis. This crisis may occur several days before the temperature has reached the normal point Especially notable at this stage is the instability of the heart's action; daily variations of 20 and more beats may occur. In other cases the pulse remains high after the temperature has become normal. Such irregularities may be transient, but when marked they are usually the precursors of more serious manifestations. The pulse, after dropping to normal with the temperature, may remain there for several days, and then suddenly rise to 130 or more, persisting at this rate with wide daily variations for several weeks. This rise, in what Schmoltz terms the tertiary period, always indicates some cardiac lesion.

During the early stages of the disease, the heart sounds often show some impurity or even a systolic murmur, which commonly vanishes in a few days, but in some cases the murmur becomes more marked as the temperature falls, while other symptoms arise which leave no doubt as to the presence of a heart lesion.

More often a murmur develops at the end of the first or during the

second stage; not infrequently they appear later. Their character varies, being sometimes blowing, at other times harsh and humming, generally systolic in time, sometimes heard louder at the apex and at other times at the base, and usually accompanied by an accentuated second pulmonary sound. In 14 per cent. of his cases Schmoltz observed an increased area of cardiac dulness. As a rule, the dilatation sets in toward the end of the febrile period, but it may be deferred to the period of convalescence and suddenly follow some unusual exertion.

Practically no subjective symptoms accompany these lesions, so long as the child remains in bed, though there may be palpitation and a little dyspnœa. The temperature remains normal, or is but slightly elevated. Cardiac complications are not much more frequent after the more severe attacks of scarlet fever, with marked involvement of the throat, than after milder cases, and some of the gravest cardiac lesions follow very mild attacks with uncomplicated convalesence. As rheumatic pains are very common in scarlet fever, Heubner has referred both heart and joint lesions to a rheumatic infection. Schmoltz, on the other hand, finds that cardiac lesions are no more common among the cases with arthritic pain than in instances without this symptom. He believes that the two complications bear no further relation to one another than that of having a common cause. These heart affections were formerly all referred to an endocarditis, but, since Romberg's paper, the importance of the myocardial changes has been more generally recognised. Endocarditis is a very rare incident in scarlet fever. In a review of thirty autopsies the author could only find three showing changes on the valves. Myocarditis is, on the other hand, very common, and there can be little doubt that most of the changes are referable to this lesion. Why the signs of a mitral insufficiency should so frequently persist after recovery as they do in these cases, may be variously explained. It is well known that a relative insufficiency lasting indefinitely may depend upon changes in the heart muscle alone. The heart, in scarlet fever, should be carefully watched, not only during the disease but also in convalescence. Grave results may follow too early strain. When cardiac complications arise, the one important point in treatment is to insist upon prolonged rest in bed.—*Am. Journ. Med. Sc.*, Phila., 1905, May.

Cerebellar Tumours.

In a review of some recent clinical papers on cerebellar tumours, Warrington (*Med. Chron.*, Manchester, 1905, June) discusses the localisation, symptomalotogy, and diagnosis of these growths. Schuster finds that about a fifth of all tumours of the brain are in the cerebellum, and hence, considering the relative size of the great and small brain, the cerebellum may be regarded as a site of selection. They occur more frequently in the lateral than in the middle lobe, and this is of especial importance since lateral lobe tumours can be often removed, since lately it has become possible to diagnose the side on which the tumour is situated. Another favourite site is the angle formed by the cerebellum, medulla, and pons, whereas tumours of the peduncles are rare. The tumours specially to be considered are tubercle, sarcoma, glioma,

and cysts. In children the order of frequency is tubercle, sarcoma, and glioma, whereas in adults it is glioma, sarcoma, and tubercle. One-half the cases of tumour of the cerebellum in children are tubercle, whereas in adults only one-eighth are tuberculous. The tumours vary greatly in size, being sometimes as large as a hen's egg, and they may either be round or irregular in shape. More than one tumour is found in nearly a half of the cases, and as many as twenty isolated tuberculous masses have been found. In three quarters of Allan Starr's collected cases the tumours were in the posterior fossa, so that the subtentorial region is specially selected. The tumour is generally surrounded by an area of softened brain substance, the softening being probably due to the infective nature of the growth. These characteristics, multiplicity, and softening with destruction of brain tissue, render operative interference of doubtful utility. Horsley is in favour of operation in some cases; von Bergmann is opposed to it.

Sarcomatous tumours are primary and solitary, slow in growth, and compress rather than cause softening of the brain substance. The tumour is often sharply defined from the surrounding brain substance, and is eminently favourable for operative interference. The most important characteristic of the glioma is that it invades but does not destroy the cerebellar tissue. It has the colour of brain matter, is a primary and solitary growth, and there is no line of demarcation between it and the brain substance. It readily undergoes retrograde metamorphosis with the formation of cysts, and the occurrence of hæmorrhages. Its slow growth and infiltrating character explains why symptoms are often absent for long periods. Mills, in a paper on the symptoms and diagnosis of cerebellar tumours (*N. Y. Med. Journ.*, 1905, February), regards vertigo as always due to irritation of the terminations of the fifth nerve in the dura mater, and reflected disturbance of the medullary nuclei. Muscular weakness is considered to be a real cerebellar symptom, and weakness in the muscles of the back has been witnessed in many cases. Romberg's symptom is always present in tumours of the middle lobe, but differs from the static ataxia of tabes, in that it is much less marked with the eyes shut. Mills is in conformity with most writers in considering that the staggering generally takes place towards the same side as the lesion. Retraction of the head and neck, and opisthotonus and general tetanic rigidity, are rare symptoms when the lesion is limited to the cerebellum. Most of the tumours of the cerebellum produce symptoms of destruction. States of asthenia and atonia are frequent, and tremor especially of the head and upper extremities was a notable symptom in some of the cases seen by the writer. The muscular sense is not lost, cutaneous sensation is also normal, loss of smell is uncommon, and clonic spasm is an infrequent symptom. Absence of symptoms is in some cases due to the slow development of the tumour.

Cerebellar fits are regarded as due to the irritation of the labyrinth and later to pressure on the pons and cerebellum. These fits are characterised by a sudden increase of tinnitus; vertigo and blackness before the eyes; a tendency to drop or fall; sometimes sudden blindness and loss of consciousness, and in severer cases tonic spasm generally of the extensor type. With regard to the ocular symptoms, choked disc

occurs in 87 per cent. of the cases; one-sided neuritis or distinct excess is usually on the side of the tumour. Blindness may be due to post-neuritic atrophy or to pressure on the chiasma, which always in some degree accompanies cerebellar tumours.

In a paper by Stewart and Holmes (*Brain*, London, 1904), some of the symptoms are discussed in detail. Much importance is placed on the character of the vertigo or the direction of the sense of rotation or apparent rotation of objects, which is always away from the side of the lesion, according to those authors. Under the heading of cranial nerve symptoms, the nature of the disorder of the eye movements is fully considered, and it is stated that, in lateral lobe tumours, the ninth, tenth, eleventh, and twelfth nerves are never affected. Under motor symptoms are considered paresis, ataxia, attitude, tremors, and the gait. Sensory symptoms are absent and reflexes are variable. They consider that the site of a cerebellar tumour can be diagnosed in the majority of cases with accuracy, and they base this opinion on forty cases, in twenty-two of which the diagnosis was confirmed either by post-mortem examination or by operation.

The Treatment of Whooping-Cough.

Stepp (*Therap. Monatsh.*, 1904, November) claims that in fluoroform we have a drug of the utmost value in the treatment of whooping-cough. Fluoroform is a drug of the chlorine, iodine bromine series, but is much more powerful in its action than any of the others. The solution generally employed contains 2 to $2\frac{1}{2}$ per cent. fluoroform dissolved in water, and the dose is a teaspoonful every hour for babies, while older children may have up to a tablespoonful. Stepp illustrates the result of his treatment by a series of graphic curves, by means of which the number of paroxysms are shown from the commencement of treatment until the whoop has disappeared. He has treated twenty-two cases by this method, eleven of the cases being under a year old, and the remainder all under four years, and he has not lost a single case. The paroxysms diminished in force and number from the day of commencing treatment, and the duration of the characteristic cough was reduced to from six to eighteen days. The illustrative curves demonstrate a very rapid fall at the beginning of treatment, then more gradual, and once again a much more rapid decline, and this fall of the curve is so regular in its course as to suggest some specific action of the drug. The author records at length many cases showing the result of his treatment. Thus, in one baby the number of attacks fell in three days from twenty-three to fifteen daily; in another infant of four weeks the attacks diminished from fifty-five to nineteen; and in still another from twenty-seven to three. Results such as these speak volumes for the efficacy of this drug, for even discounting the optimism of the writer in favour of his new remedy, any treatment that can show twenty-two consecutive recoveries in severe cases of whooping, mostly occurring in infants under a year, is certainly deserving of a very extended trial. The drug is tasteless, ordourless, and apparently harmless, its only disadvantage being that it is somewhat expensive. Sometimes it occasions some slight pharyngeal irritation on being swallowed.

REPORTS OF THE MEDICAL SOCIETIES.

EDINBURGH MEDICO-CHIRURGICAL SOCIETY, *June* 7, 1905.—Professor CHIENE, C.B., President, in the chair.—Mr. MILES showed four successive cases of acute generalised peritonitis, treated by removal of the appendix and washing out the abdomen.—Mr. CAIRD showed—(1) A man after trephining for extradural hæmorrhage; (2) a patient after removal of a gall stone which caused intestinal obstruction.—Dr. NORMAN WALKER showed a boy suffering from molluscum contagiosum. —Dr. GIBSON showed a man suffering from ophthalmoplegia, externa and interna.—Mr. ALEXIS THOMSON showed a man after operation for tropical abscess of the liver treated by syphon drainage after the method of Sir Patrick Manson.—Mr. MILES showed—(1) Vermiform appendices removed from patients shown at the meeting; (2) spleen removed for traumatic rupture.—Mr. CAIRD showed—(1) Gall stones removed from various cases; (2) urinary calculi and preparations from a case of suprapubic prostatectomy.—Dr. GIBSON showed a heart showing combination of mitral and tricuspid stenosis.—Dr. GEORGE R. WILSON read a paper entitled "The Onset of Fear and the Onset of Pain in Cardiac Disturbance." He first described several cases in which paroxysms of terror had occurred during the night, and in which there was some cardiac disturbance. The night terrors of children are also probably associated with cardiac disturbance, which is possibly brought on in nervous children by some intestinal irritation. He also cited cases in which cardiac disturbance produced not paroxysms of fear but of pain. These pains may be referred to the heart or to other parts of the body, such as the arm, foot, testicle, etc. It seems probable that the paroxysmal terror in the former class is pathologically analogous to the pains in the latter. These paroxysms are not dangerous to life, and the patient is greatly relieved to hear that the cause is cardiac and not mental.—Dr. JAMES read notes of some cases of acute cerebro-spinal fever and intoxication occurring recently in Edinburgh and in the surrounding district, clinically resembling forms of epidemic cerebro-spinal meningitis. These cases had symptoms of headache, sickness, vomiting, and twitching of the muscles, which twitching may be so severe as to produce opisthotonos. There may be no temperature, but sometimes high fever is present. Unconsciousness may come on, and in some cases is the first symptom noted. Lumbar puncture relieved two of his cases very remarkably. It was done in all the cases, but in none was anything found of the nature of bacillus intracellularis. In those cases in which a post mortem examination was made, nothing abnormal was discovered save a certain degree of congestion of the membranes of the brain and spinal cord. These are not cases of true cerebro-spinal meningitis, but are rather of the nature of toxin poisoning. The source of the toxin is yet to be discovered.

EDINBURGH MEDICAL JOURNAL.

EDITORIAL.

The Management of Public Hospitals.

THE address delivered at the last annual meeting of the New Zealand Branch of the British Medical Association, by Dr. Ernest Roberton, is one which will well repay perusal by those interested in the management of Public Hospitals.

The Public Hospitals of New Zealand, it is true, are State institutions, supported by compulsory rating and taxation, and to some extent by endowment, voluntary contributions, and fees paid by patients. In regard to maintenance, therefore, they differ to a considerable extent from the public hospitals of this country, which are supported by voluntary contributions and endowment.

Although the conditions are thus different, and much that Dr. Roberton has to say is not applicable to our own institutions, yet, in at any rate one respect, we are heartily in accordance with him when he pleads for the control in the management of hospitals being placed in thoroughly competent hands.

He argues, and with a good show of reason, that the Honorary Staffs have a special claim to representation on the Boards. It has been found apparently in New Zealand, as well as in this country, that Hospital Boards are not always in sympathy with the medical staffs of the larger hospitals, nor the medical staffs with the Boards. It is now an almost universally recognised axiom, that hospital work is best where the medical and lay authorities freely interchange their views and strive to work in harmony towards a common end.

To obtain this condition, the direct representation of Honorary Staffs on Managing Boards is essential. This view simply reaffirms, of course, the opinion of the senior physicians and surgeons of the London Hospitals expressed in connection with a recent dispute, which was thus stated: "From long experience of hospital administration, they desired to record their firm conviction that the demand of the Staff for representation on the Board of the Hospital was a perfectly reasonable one, and one which in other hospitals has conduced to harmonious working and efficient administration." It was held that such representation, in this particular case, would, beyond all other methods, secure the best and most satisfactory mode of intercommunication between Medical Staff and Board of Managers, and would be to the great and permanent benefit of the Hospital. All this is more or less, no doubt, a matter of history now, but the question is one which, as Dr. Roberton shows, has still to be decided in New Zealand—

and possibly also in Edinburgh, if the experiences of the last two or three years in the management of the Royal Infirmary are to form a precedent for the future.

However estimable gentlemen may be in a private capacity, and however zealous they may be in the cause of charity, it does not follow that they are well fitted for the management of a large public institution, in connection with which many questions of a highly technical nature must constantly arise. Gentlemen possessing business capacity are rightly placed on such Boards, but they have their limitations, and it is therefore highly desirable that those who are skilled in special departments—such as representatives of the acting Staff—should find a place in the management.

It seems to us that in our Royal Infirmary we have a striking exemplification of the harm which may be exerted by want of special knowledge. The Infirmary was built nearly thirty years ago, and at the time was justly considered to represent the best model of hospital construction. Every detail of the plans was worked out with due regard to what the most skilled experts considered necessary and calculated to lead to the best results in the treatment of disease. The ground was surveyed and the pavilions were erected so as to make as full a use as possible of the available space, while, at the same time, keeping in view the essential conditions of proper ventilation and access of sunlight to the wards. It was recognised then that the most had been made of the ground at disposal, and that any extensions in the future must be carried out on a new site. The hygienic principles upon which these plans were based represented at that time the experience of the highest authorities in hospital construction, and these principles retain as much force to-day as they did then. It has therefore filled many people with dismay to see how these original plans and principles have been disregarded by successive Boards of Management. We do not hesitate to say that few if any of these Boards have had the requisite knowledge to fully appreciate the responsibilities involved by their actions in this respect. The frequently recurring necessity for increased accommodation has been met in apparently the most casual manner, by the interpolation of an excrescence to the existing buildings here, or the construction of a new block there, until the principles which influenced the adoption of the original plans have been nullified or their value seriously detracted from. It seems never to have entered the minds of those who are responsible for these modern "improvements," that spaces were left vacant between the pavilions, not for the purposes to which they have been, one might almost say, degraded, but for the sake of the best interests of the sick, and as a result of a carefully thought-out plan prepared in accordance with recognised principles of hospital construction. Galton long ago enunciated the rules—universally accepted—which should be adhered to in the building of hospitals, and pointed out the danger of encroaching upon the air space surrounding pavilions.

We have noticed recently that another of these excrescences to which we have referred has been run up with feverish haste and is nearing completion. At the same time, a great deal of expensive tinkering has been going on in the pavilion immediately adjoining it, and on inquiry we learn that this is to be the new surgical outpatient department! It would be interesting to learn to whose genius we are indebted for this last monument of short-sighted policy. We presume that the views of the Honorary Surgical Staff received careful consideration, and that the Managers consulted an architect experienced in hospital construction. If they did not, then, in our opinion, they have committed a grave fault, and they must be numbered amongst those of whom Dr. Roberton has had experience in New Zealand, and in reference to whom he says: "There are few of us who could not tell of squandered money and wasted energy for which well-meaning but self-sufficient Local Boards are responsible, through failing to realise that they are much less likely to solve the problems presented by an expanding hospital by means of experimentations, than by quietly following where the experience of others has shown the better way." If an experienced architect was employed, then all we can say is that we cannot imagine from whence his experience has been derived, or how he has lent countenance to the building of such an outpatient department for a great institution like the Royal Infirmary, with its thousands of outpatients and its hundreds of students—and bearing in mind all the requirements which modern surgery now makes in regard to asepsis and other details of treatment, even the Managers may be surprised to hear, in the treatment of outpatients.

Better, we say, the old order of things for a few years longer, than panic construction of inadequate and expensive buildings which cannot satisfactorily fulfil their object either now or in the future, and which materially interfere with the hygienic condition of existing wards.

We cannot help sympathising with Dr. Roberton's desire that an experienced authority should control the erection of hospital buildings, and that the Boards of Management should consist of men who can bring special knowledge and experience to bear upon the many important questions of administration which must constantly arise, and not, as is too often the case, be largely composed of gentlemen who, however well meaning and zealous, yet have no special qualifications for the duties they are called upon to perform.

Medical Officers of Volunteers and the Army Council.

MR. ARNOLD FORSTER'S "private and confidential" circular to military officers commanding districts is one of great importance to medical officers of Volunteers, indicating as it does a complete revolution of ideas regarding the functions of the auxiliary forces,

and their place in the army scheme. There can be no question whatever as to the original intention for which the auxiliary forces, or at any rate the Volunteer force, was raised. That intention was, to provide a body of men for the defence of these islands from invasion. With that intent, and to provide such a force, the Volunteers have existed for nearly half a century; and not only have they existed, but by adapting themselves to changing conditions as accurately as they were permitted to do by the powers that be, and sometimes in spite of the cold water thrown on their efforts, they have attained the object for which they were called into being, and there now exists in them a body of citizen soldiers numbering somewhere in the neighbourhood of a quarter of a million of men, prepared to go anywhere within these islands to repel invasion.

Till June 20 of this year of grace it was believed that this was still the *raison d'être* of the Volunteer force. But now it would appear that that body is to be criticised from another standpoint, and one fundamentally different. That blessed word "Efficiency" has been invoked, and in its name a complete revolution must take place in the structure and functions of the body in question. This is not the place in which to enlarge upon the factors which have brought about this change of view; they may be put down, almost in three words, as desire for retrenchment, desire for conscription, and the comfortable doctrine of the "Blue-water" school, which, if pushed to its logical results, would explain away the need for any home army whatever. Where this matter concerns us is the position in which it places the medical officers of Volunteers. For some years these officers have had placed upon them the medical examination of recruits, a very necessary and proper duty which they were called upon to perform, and which has duly been carried out. But it has been carried out with the clear idea that the recruits in question were to be examined merely as to their fitness for defence work in these islands, and naturally there must have been many men admitted who are fit enough for that purpose, but who would be unable for the stress of campaigning abroad. The expectation is that at the different camps the recruits will be re-examined by officers of the Royal Army Medical Corps, and if this be so it is quite clear that the recruits will not by any means attain the standard set up by examining officers of that corps. It will be too much to expect of these officers that they should adapt themselves automatically as it were to the position of medical officers of Volunteers, and judge the recruits from that standpoint; and it follows that rejections will of necessity occur. These, however they may suit the present temper of the Army Council (and what that temper is may well be judged from the recent speech of Lord Roberts in his place in the House of Lords), but it will suit neither the views of officers commanding, nor the recruits who have joined, these Volunteer battalions, and who have just put in their forty drills,

to be told that they, after all their trouble, are not fit for the work for which they were recruited. Apart from the recruiting question, however, the action of the Army Council is unfair on the Volunteer army as a whole. It is not fair that a body of men raised for the purpose of defence, and not with any idea of foreign service, should be examined with the view of ascertaining their fitness for foreign service. A more sure and certain way of cutting down the Volunteers could not be devised than that. And if this be the result, and the Volunteers be depleted of all except those who are prepared at once to take the field abroad, a grave injury will be done not only to the Volunteers, but, through them, to the nation at large, and to the public health.

To all of those interested in Volunteering, of whatever rank, the spectacle presented by the rapid passage of young men through the ranks and back to civil life has caused much searching of heart. "For what use is it all," they say, "to work these men up to a high degree of efficiency, when they disappear at once from the service probably for the sake of Association football." It would appear on the face of it, that this is a useless sort of work. But from the point of view of the public health this way of things is not so bad as it seems. The three years' training to which every volunteer must submit, for it takes three years' capitation grant to cover the prime cost of his uniform, such a training, at an important period in his physical development, is an excellent thing for any youngster. But as a regimental unit, *e.g.*, a volunteer battalion has a limit even to its full war strength, it follows that to run a succession of young fellows through the ranks is a better thing for the public health than to have a third of them serving for thrice as long. Wherefore a Volunteer army of short service men, apart from its being the original objective of the Volunteer movement, serves the purpose of the national health much better than a more stationary force of "amateur regulars," and as such any attempt to do away with the former and establish the latter should be objected to by the medical press. The medical officers themselves have no voice in the matter. As officers in that army they have simply to carry out the orders of officers commanding battalions; but if the medical press will use its proper influence, public opinion may be led to see that not only will the threatened action of the Army Council bring down disaster on the Volunteer army, but that the national health will lose a most valuable asset.

Crocks and Cranks.

THE air is full of "the simple life." It is discussed in the market-place, at the dinner table, even in the schoolroom. Endless societies have started with this motto as their guiding star. One society eschews beef, another beer; this one cheese, that one turnips. A few are suspicious of athletic exercises, several are severe on shower baths, and one at least finds the devil itself in the pipe. In fact,

there is hardly a single instrument of pleasure that nature and human design have provided for poor humanity, that has not had anathemas hurled at it by the new philosophers. Carlyle, on being requested to give his opinion on the treatment of criminals, once replied, "Give them brown soup and a footstool and kick them to the devil." Well, if we omit the definitive use of the foot, the treatment is very much on a par with what some of the new extremists, with "Simple Life" printed on their notepaper, recommend for our salvation. There are to be no more cakes and ale, ginger must no longer be hot in the mouth, the flesh pots must be abolished: life is no longer to be bearable by beer and skittles. Well, if there is not much beer in the new doctrines, there is a good deal of skittles—or what in our bread-and-butter days schoolboys used to call, with more emphasis in their Anglo-Saxon than literary grace, "Rot." In reading over some of the principles laid down by these Neo-Æsculapian Societies, one is inclined to believe that their constitution and membership would be suitably described as the Society of Crocks and Cranks: but the danger arises when sane and healthy members of the body social become hypnotised by their proceedings, and by turning from the normal life take to feeding on water and beans, or whatever dietary is laid down by these precious aspirants to the new physiological heaven. We are pleased to see that our wise friend Mr. Punch, who possesses the first necessity for true sanity, the sense of humour, has taken the matter in hand in the epilogue to his last volume. After describing an amusing interview that the sage had undergone with a follower of one of the new health régimes, whose diet included bracken and whose exercise excluded cricket and embraced the skipping rope, and whose general orders included the abolition of conversation during meals, and of beds, he expresses himself in these simple and commonsense terms: "Efficiency is to be gained only by maintaining a level head and a healthy body, working hard and abstaining from extravagances of every kind. A few shrill prophets of evil should not cause us to run to such extremes as you have described to me. To acclimatise exotic habits and encourage anti-social ones can never lead to an efficiency worth the name. Be sensible. Eat well and drink well: work well and play well; burn your skipping ropes and throw away your bracken; talk over your meals and sleep in beds; read good stories and forget scientific catchwords. Above all, don't be prigs." All this is mere commonsense, but the fact that it is so requires that it be repeated on every possible occasion, for nothing is more readily forgotten than the obvious. Even if it were commonplace, it would be all the more valuable, for "Commonplace," as Mr. John Morley says, "contains the truths that are indispensable." Of course everybody knows that a large percentage of people eat and drink too much. They also know that an equally large percentage eat and drink too little. But one does not justify the other. The physiological crime of over-

eating is certainly much advertised nowadays, though we doubt if it is more prevalent than it was. It certainly is not so rampant as in the days of the Roman Empire, nor in the gorging times of the Georges and the Early Victorian period. It is some consolation to know that Cranks and Crocks have existed in all times, and have come to the same weary end. The Universal Panacea is no modern invention. Proverbial philosophy is no *fin-de-siècle* invention. "Early to bed, early to rise, makes a man healthy and wise," and yet not wise enough to write an accurate proverb. But of course there is everything to be said for the simpler life, scientifically considered. We must never lose sight of the sense of proportion. As our body, our climate and our work is, so should our food, our exercise, and our sleep be. And although there is still a little to be done to modify the gluttonous tendencies of mankind, yet, taken on the whole, we are not far from the Aristotelian mean. The Gargantuan feast is a thing of the past; although it occasionally turns up in certain teetotal households. The three bottle "Blackstrap" days are now of only literary interest. "Nipping" between meals is confined to the very few. To the latter reform we attribute in a large degree the decrease in the consumption of wines and spirits. We are getting gradually on to the right track, but we prefer to do so by keeping our eyes on the signposts of science, and not on these highly coloured posters designed by the lay crock and mono-idead crank. If the latter would turn his attention for an hour to Mr. George Meredith's "Essay on the Idea of Comedy," he might find much to help him. He will find there many references to those who run riot in extravagances, congregate in absurdities, and drift into idolatries—and may perhaps learn that the sense of humour is the sense of perspective, and the sense of perspective the sense of proportion. He may then be led to believe that no longer can Mr. Harold Begbie, the Dean of Canterbury, Mr. Arnold White, or even President Roosevelt, be claimed as Prophets of the Sane Life, but only as enthusiasts mounted on hobbyhorses and riding themselves fast to the Inferno of Crankdom.

Death of Sir William Muir.

"Our University has cause to be grateful for its Principals," said Professor Charteris at the church service when Sir William Muir, K.C.S.I., LL.D., D.C.L., Ph.D., and ex-Principal of the University of Edinburgh, was laid to rest.

"I knew four who have passed away," he continued, "and they were all men to be honoured with pride. Dr. John Lee was, I suppose, the most learned man in Scotland, though Sir William Hamilton was then alive; Sir David Brewster was a prince in science and culture; Sir Alexander Grant was a leader of scholars steeped, like himself, in Greek philosophy; and then came Sir William Muir, statesman, linguist, Christian, sage—well called, for his sympathy with young men, the Student's Principal."

We also can re-echo the words of Professor Charteris,—"our University has cause to be grateful for its Principals,"—though we have known but two of those he mentions. How few of us realised in our younger days, as we saw the venerable white-haired gentleman ride into the quadrangle on his quiet cob, or saw the same dignified figure preside at a graduation ceremonial, that there was a man who had helped to make history, and had played no small part during the great irruption which threatened the very life of our Indian Empire. Still less, perhaps, did we appreciate that there stood before us the author of "The Life of Mahomet," and many other works as profound in their learning as they are scholarly in execution.

It is only as our Principal we are able to speak of him, and that is not an easy task. In every province of university life—intellectual, social, religious, and athletic—he took an active interest, and made his influence felt. To every student he was accessible, and there must be many of these scattered over various parts of the globe who can bear testimony to the benefits they have derived from his kindly interest and sound advice. Generous, hospitable, ever courteous, always dignified, the University has lost one who, as Principal, was honoured and reflected honour upon it, and whose good works will long be gratefully remembered.

Hermann Nothnagel. To many it will seem impossible to imagine Vienna without Nothnagel, so commanding was the personality of the great clinician, whose loss the whole medical world to-day laments. A North German, trained under Leyden and Traube, Professor in Freiburg, Jena, and finally in the Austrian capital, Nothnagel's career was brilliant. A teacher whose clinical lectures were models of perspicuity and graceful diction, a physician esteemed alike by great and poor, a clinician who had enriched medicine by such works as his "Topischen Diagnostik der Gehirnkrankheiten," by his studies on intestinal diseases, and the editing of his monumental "Specielle Pathologie und Therapie," a man of liberal culture and free from the narrow outlook bred by national or racial exclusiveness, the protagonist of freedom against intolerance in the strifes which have afflicted the medical faculty of Vienna,—it will be hard to fill the place of the successor of Skoda and Oppolzer. Professor Nothnagel's death was entirely unexpected—to all save himself. His vigorous frame seemed to give pledge of length of days, but we now know that for long he had silently borne the pangs of angina; after a busy day's work on July 6th, he returned home from seeing a patient at half-past eleven at night, and died soon after midnight on the 7th. He realised in his life his own axiom—*Nur ein guter Mensch kann ein guter Arzt sein.* Be this his epitaph.

ORIGINAL COMMUNICATIONS.

ON THE TREATMENT OF ACUTE PERITONITIS.[1]

By Professor K. G. Lennander, Hon. F.R.C.S. Eng. & Ed.,
Upsala, Sweden.

When fighting against peritonitis we have to observe one thing above all, and that is the prophylaxis. All the stages of illness that, according to experience, may be followed by peritonitis, must be studied and diagnosticated minutely. Where an acute peritonitis is to be apprehended, we must try to remove its cause. This indication is the easiest to follow, and saves the greatest number of lives in cases of "la grande maladie de l'abdomen," acute appendicitis, where one is bound to excise the appendix before a purulent peritonitis has had time to arise, or while it is limited to the nearest region around the appendix (Senn, M'Burney, 1889).

The diagnosis of the pre-perforative stage of various illnesses of the abdomen, that is to say, the diagnosis of the first traces of lymphangitis of the abdominal wall and of acute peritonitis, should more and more prove of value in the fight against the various infections of the abdominal serosa. The *défense musculaire* and a deep local tenderness, and possibly also the cutaneous hyperalgesia, studied chiefly by Head, will be of importance. An elimination of the source of infection in the pre-perforative stage is nearly as free from danger as an *opération à froid.*

If one has not succeeded in preventing an infection from spreading over a greater part of the peritoneum, it may be the result of a perforation or effected in other ways; the infection, and thus also the peritonitis, should immediately be limited by an operation.

If the author's opinion on abdominal pains proves right, and is generally accepted, it will effect a better understanding of the symptomatology of abdominal illnesses. He is of opinion that the sensation of pain in the abdomen never issues directly from the viscera, but is produced by an irritation, proceeding from these organs, of cerebro-spinal nerves in the parietal serosa and subserosa in a mechanical, chemical, or infectious—toxins or microbes—way. From this we may draw a conclusion already confirmed by experience: a peritonitis in the centre of the abdomen, namely, below the colon, above the pelvis, behind the omentum and between different portions of the small intestine, may spread over a vast portion of the serosa and seriously affect the wall of the small

[1] An Introductory Lecture at the First Congress of the International Society of Surgeons, Brussels, September 1905.

intestine before it gives any local symptoms. The same is true with regard to every case of peritonitis that does not affect, or at least very little, the parietal serosa.

Here the author does not enter upon the microbic etiology of acute peritonitis. He is of opinion that a microscopical examination is always to be made during the operation if circumstances permit. Even gonococcal peritonitis has, under the author's hands, not always proved as benign as it is said to be. He is of opinion that in every case where a peritonitis is spreading, an operation is to be made, and this independently of the result of an eventual diagnosis of the microbic cause.

In order to understand one another perfectly, we must agree upon a fixed terminology. The term diffuse peritonitis should not be used, for it has three different meanings—(1) Not limited, progredient peritonitis (cp. the expression "diffused light," and for a drop of water flowing out over blotting-paper); (2) a widely spread peritonitis; (3) general or total peritonitis.

From a practical point of view, the two chief terms should be —(1) Encysted peritonitis or the peritoneal abscess; (2) free (libera) peritonitis. A peritonitis is *encysted* if the inflamed region is enclosed between adhesions, outside of which there is a normal or nearly normal serosa. There may be one or several *loculi*. There may be encysted peritonitis—peritoneal abscesses—in two or more areas in the same peritoneal cavity. A peritonitis is *free* if the inflamed region is not enclosed by adhesions.

It is important not to consider the term *peritonitis libera* as synonymous with the term *peritonitis progrediens*. From early operations it is known that limited regions of the serosa may be inflamed and covered with purulent exudation, and still the surrounding serosa be of a nearly normal appearance. It may be supposed that if in such a case there had been no fresh infection, the exudation would soon either have become sterile and been resorbed, or been surrounded by adhesions. In this case it would have formed a peritoneal abscess.

Cases of free peritonitis affecting small regions, easily surveyed, are at least as easy to operate as peritoneal abscesses.

In this lecture the author will use the term *peritonitis migrans* instead of the term *peritonitis progrediens*, because the terms *pneumonia migrans* and *erysipelas migrans* are generally accepted, and because the adjective progrediens is intimately connected with v. Mikulicz' *peritonitis fibrino-purulenta progrediens*. An acute migrating peritonitis resembles an *erysipelas migrans* in many respects.

Thus free peritonitis does not always comprehend migrating—spreading—peritonitis. But whenever a peritonitis is free, that is to say, whenever an infection of the serosa is not encysted, there is a great danger of the spreading of the infection and the peritonitis (1) by *lymphangitis acuta migrans* in the subserosa, (2) by

the movements of the exudation in the peritoneal cavity. How many patients with an early free peritonitis have lost their lives, only because they have risen from their bed and gone to the w.c., to give only one example of danger.

Free and encysted peritonitis are to be regarded as the two main types, important from a prognostical-therapeutical point of view, during the development of the inflammation of the serosa. Between them are many, many transition stages. In cases of free migrating peritonitis there may be from the second or third day of the illness lots of adhesions, but they do not separate an inflamed serosa from a sound one. In spite of the adhesions, the infection spreads without being checked. The serosa reacts to the infection by forming various kinds of exudation: serous, purulent, fibrinous. At operations made in a late stage you may find in the same peritoneal cavity a free migrating peritonitis and an encysted peritonitis, if, at the time of infection, only a small quantity of microbes has reached a certain portion of the abdomen.

In every *report of operation* there should be recorded—(1) The etiology, for example, appendicitis, ulcus ventriculi; (2) the region or regions of the abdomen that are affected; (3) the quality of exudation—serous, fibrinous, purulent, or putrid; (4) whether the peritonitis is encysted or free; (5) whether it is migrating or not.

If we leave the power of resistance of the patient out of consideration, the *malignity of a peritonitis* depends upon three things—(1) The etiology and the virulence of the infection; (2) which part of the peritoneal cavity is first infected; (3) at what stage of the illness the patient has been operated upon.

There are two things that are to be dreaded more than anything in cases of infection and acute peritonitis. These are *the passage in masses of the microbes and their toxins into the blood circulation, and intestinal paralysis.* The toxins poison the vasomotor and the respiratory centres. The paralysis of the former brings about a dilatation of the whole system of abdominal vessels. The patient "bleeds to death into his own abdominal vessels."[1] The hyperæmia of the abdomen is probably to be considered the most valuable weapon of the body in the fight against an infection of the abdominal cavity (cp. Bier's *Stauungshyperämie*). It is only when it reaches a degree that hinders the necessary function of other organs that it becomes dangerous.

The peritoneal cavity is a big lymph space, which everywhere is in communication with the lymph vessels and blood vessels of the subserosa. The absorption through the serosa is quickest and most copious in the centre of the abdomen and through the serosa of the diaphragm: slowest in the other parts of the periphery of

[1] Heinecke, "Experimentelle Untersuch. über die Todesursache bei Perforationsperitonitis": quoted in Hildebrandt's *Jahresb. f. Chir.*, 1901, S. 583.

the abdomen. At the commencement of a peritonitis the absorption is always increased.[1]

The absorption ceases or becomes slower in the same proportion as a rich serous or purulent exudation gathers in the abdomen, free or encysted. This is a double advantage to the patient. The toxins are richly diluted, and at the same time their absorption is momentarily prevented or rendered more difficult.

The absorption is prevented chiefly by thrombosis and compression of lymph spaces, lymph capillaries, and blood capillaries. It has been frequently observed that peritoneal abscesses in a certain stage do not give rise to any general symptoms. There is no fever, no albuminuria, and even the leucocytosis may be normal. Sooner or later there will be a raised temperature again. An experienced man knows for certain that this shows that the exudation is purulent. The general symptoms recur at the same time as toxins are resorbed again, as soon as new capillaries are formed, the pressure on the capillaries and lymph spaces has ceased, or the thrombi have disappeared.

In every case of more advanced acute peritonitis the cause of *intestinal paralysis* is a toxic (and microbic) poisoning of the wall of the intestine with anatomical changes in the lymph spaces and of the ganglion and nerve cells in Auerbach's plexus. These have been demonstrated by Askanazy and Walbaum.[2] This view of the explanation of intestinal paralysis is supported by the observation of Magnus,[3] that every spontaneous movement of both the circular and the longitudinal layers of muscles in the wall of the intestine ceases as soon as the said smooth muscles have been separated from their connection with Auerbach's plexus, which, as is known, is situated between the two layers of muscle.

It is probable that the normal peristalsis of the intestine has its origin in the chemical and mechanical qualities of the intestinal contents. The contents of the intestine produce a greater or lesser irritation of the mucosa. This irritation is transmitted to Auerbach's plexus, which furnishes both muscle layers with a co-ordinate innervation. The most important element in normal peristalsis is the loosening or widening of the intestine on the distal side of a certain portion of the contents of the intestine, and at the same time it contracts on the proximal side of the same contents, which consequently are pressed forward in the intestine.[4] The position of Auerbach's plexus under the longitudinal layer of muscles is near the serosa. If this becomes infected, toxins, microbes, lymphangitis, and other inflammatory changes quickly reach the plexus, where they produce greater or lesser changes, which at worst effect the death of the

[1] Clairmont and Haberer, Hildebrandt's *Jahresb. f. Chir.*, 1902, S. 627.
[2] Reported, *ibid.*, 1900, S. 770.
[3] Magnus, *Arch. f. d. ges. Physiol.*, Bonn, 1904.
[4] Magnus, *loc. cit.*, S. 132.

plexus. The affected part of the intestine will probably never again be capable of movement. The peristalsis of the stomach and the intestine are affected by different peritoneal infections. In cases of peritoneal abscesses, it is generally not dangerously disturbed. If the pus increases without a corresponding dilatation or displacement of the adhesions, one or several coils of the adherent intestine are easily compressed. The result is meteorism, vomiting, ileus, symptoms that easily disappear after the emptying of the abscess. This variety of ileus is mostly observed in case of encysted exudations in the pelvis that have not been diagnosticated in time. In most cases of free migrating peritonitis, intestinal paralysis is to be apprehended, but its period of onset and its degree vary with different infections. The author thinks, as is said before, that the first and most important cause of intestinal paralysis is a toxic poisoning of Auerbach's plexus. Consequently, in any given case it is the virulence of the toxins, compared to the powers of resistance of Auerbach's plexus, that decides the time of onset of intestinal paresis and paralysis. There will also be an intestinal paralysis in every case of peritonitis, as soon as the inflammation of the wall of the intestine has produced a high degree of engorgement, œdema, and infiltration in the layers of muscle, which prevent their contraction.

Next to the absorption in masses of toxins and microbes at the onset of a peritoneal infection, there is nothing more dangerous during the development of a peritonitis than the occurrence of intestinal paralysis. Even if the paralysed portion of the intestine is very short, the carrying on of the proximal contents of the intestine is rendered impossible. The quantity of the contents is increased, and at the same time they become much more virulent. The wall of the intestine is distended and subject to well-known transformations, ending in thrombosis and gangrene. It becomes permeable to toxins and soon even to microbes, so that they are not only admitted into the lymphatic vessels and veins of the intestine in increased quantity, and are carried off to the thoracic duct and to the liver, but *toxins and microbes pass straight through the wall of the intestine into the general peritoneal cavity.*

As soon as, from any cause, the free passage of the contents of the intestine is seriously obstructed, the toxins begin to pass into the peritoneal cavity. The microbes follow as soon as the toxins have poisoned the tissues of the intestinal wall to such a degree that they no longer prevent their passing.

To the first infection of the peritoneal cavity has thus been added another one *per continuitatem* through the wall of the paralysed part of the intestine and the portion nearest above. Both infections spread with a tremendous speed over the colossal surface offered by the serosa of the small intestine and the mesentery. The wall of the intestine is now attacked both from

the serosa and the mucosa. The organism is poisoned both from the peritoneal cavity and from the lumen of the intestine.

From this it is evident that an acute peritonitis in the centre of the abdomen is much more dangerous than one in its periphery. Thus it is necessary to distinguish between a *central* and a *peripheric* peritonitis. To the periphery of the abdomen belong the subphrenic spaces, the lumbar regions, the iliac fossæ, and the pelvis.

If a collection of reports of operations for acute peritonitis is to be of any use, the histories of the cases must be written with good judgment, and the reports of the operations include all details that the operator has been able to observe.

The report of the operation should mention where the peritoneal cavity has been opened. Then the source of the infection is recorded and the appearance of the serosa in those regions of the abdomen that are possible to inspect. Various exudations are described, eventual encystments and so on in the different portions of the abdomen. It is specially important to give a true description of the intestine wherever it has been possible to inspect it: the look of the serosa, circumference of intestine, paralysed or not, thickness of the wall, the mesentery, swollen lymphatic glands, etc. The author has the intention of testing in the future the irritability of the intestinal wall, not only by the air, by irrigation with saline solution, by wiping with compresses, etc., but also by Nothnagel's salt crystal and by electricity. If it is possible to produce only single contractions, but no peristaltic movements, this fact should confirm the hypothesis of paralysis of Auerbach's plexus.

If one has to speak of the prognosis after the operation, all operators might join in the following two theses: the prognosis is good or pretty good if there is much liquid exudation, much pus, and the intestine everywhere is of a nearly normal appearance and is nowhere paralysed. The prognosis is very bad if there is very little or no liquid exudation, and the coils of the small intestine are red, dry, distended, and paralysed. In the former case a good deal of serum and a mass of leucocytes have been secreted into the peritoneal cavity. Toxins have been diluted, masses of microbes have been killed. Owing to the dead leucocytes, the exudation possesses greater power of killing bacteria. In the latter case the toxins have been absorbed both through the wall of the intestine and through the parietal and mesenteric serosa. The wall of the intestine has become paralysed. Thus the organism is poisoned both from the peritoneal cavity and from the blocked intestine, or, as Lawson Tait called it, "the sewer."

The author has only time to mention other complications of acute peritonitis, such as acute nephritis, thrombosis in the portal and vena-caval systems, with emboli, acute pneumonia, pleuritis,

pericarditis, acute yellow atrophy of the liver, retro-peritoneal collections of pus, neuritis, and so on.

The author has in his earlier works on peritonitis accentuated the great importance of testing the urine for albumin, sediment, and, if possible, bacteria. Already small traces of albumin prove that the patient has a toxic or microbic nephritis, which is an argument for immediate operation. An infection of the peritoneum may have caused an acute nephritis with albuminuria and casts, although both pulse and rectal temperature for the moment show nothing abnormal.

It is evident that it must be the duty both of the medical man and the surgeon to see that a patient with acute peritonitis is operated upon as soon as circumstances permit before the infection has had time to spread much, before it has time to cause paralysis of the intestine, etc. It must be laid down as a principle to consider an acute peritonitis as a surgical case, and a surgeon is to be called as soon as a case is suspected to be one of acute peritonitis. It is he who has to decide if and when the patient is to be operated upon.

The object of an operation for acute peritonitis is—(1) To remove liquid exudation. (2) To remove or treat the source of the infection through extirpation, resection, sutures, plastic operations, tamponing, drainage. (3) To clean the infected portions of the peritoneal cavity. (4) To empty and drain the intestine when it is paralysed. (5) To provide for further discharge, by means of drainage, if possible, or at least to separate, by tamponing and draining, the portions of the serosa most affected from other portions of the peritoneal cavity, which, as a rule, is easily carried out at the periphery of the abdomen, but scarcely in the middle of it.

The more accurate the local diagnosis, the quicker and safer the operation.

If you have decided to operate, and it is impossible to perform it immediately, the patient is placed in a soft warm bed, where he should be placed in such a position that any exudation, or contents of the stomach and intestine which have escaped, may accumulate towards a point in the periphery of the abdomen. For the majority of patients a half-sitting or straighter position of the trunk, combined with 15 to 35 cms. elevation of the foot-end of the bed, will be found most suitable. By elevating the foot of the bed the patient sits firmer, and the circulation of the blood in the veins is facilitated both from the lower extremities and from the pelvis. The lumbar region, along with the upper part of the iliac fossa, becomes the lowest point on each side of the abdomen, and the middle is occupied by the hollow of the sacrum. The patient is deprived of all food and drink, except perhaps very small doses of hot water with alcohol by the mouth. If there are fæces in the rectum, 100 to 200 grms. of pure oil, of

the same temperature as the body, is infused in order to facilitate the coming evacuation of the bowels. If the rectum contains big, hard scybala, they are to be removed very carefully with the fingers. Morphia hypodermically or opium per rectum are only to be given in such doses as are necessary in order that the patient may be free from pain if he keeps quite motionless. Even for transport, complete rest and the best possible position of the body are to be arranged. While waiting for the operation, a stomach lavage or an irrigation of the intestine may be of value in certain cases.

In the clinic of Upsala every patient with acute peritonitis receives, at least half an hour before the operation, 1 cgrm. of morphia, 40 cgrms. of camphor, and 1 to 2 mgrms. of strychnia hypodermically. The patient is carefully wrapt up, being wound round with thick, sterile, hydrophile cotton-wool or blankets; the table is to be warmed. The surgeon and assistants wear indiarubber gloves. Quantities of saline solution (0·9 per cent.) at 39 to 42 C. are employed. If the intestinal coils protrude, they are wrapped up in hot (39° to 42° C.) saline compresses, covered by thin indiarubber cloth, and outside this hot sterile towels, or, still better, blankets. If one has to pass from a more infected portion of the abdomen to a comparatively clean one, one should put on another pair of gloves and use freshly sterilised instruments. Whenever it is possible, the last infected portion of the abdomen should be opened first. In cases of sero-purulent or purulent exudation in the pelvis in women, the exudation is let out, and the pelvis drained by means of an incision and tubes through the vagina before an incision is made in the anterior abdominal wall.

Before the author describes the technique of the operation, he thinks it better to speak of *drainage, infusion of saline solution into the veins during the operation, irrigation of the peritoneal cavity, enterotomy with immediate emptying of the intestine, and enterostomy*, because one must be prepared, in every serious case of peritonitis, for one or all of these eventualities during the course of the operation.

Combined tamponing and draining.—Nowadays the author does not use gauze for tamponing, but a very thick sort of cotton yarn, such as is used for wicks (Dochte). It should be inserted in sufficient quantity. Amongst the yarn is placed one or two indiarubber drainage tubes. In all places where the yarn would touch the parietal peritoneum, one has to cover it by very thin indiarubber tissue. By doing so one is enabled to remove the yarn without causing pain.

The day after the operation one begins to instil peroxide of hydrogen or glycerin with peroxide of hydrogen through the tubes. After two days or so, one may remove one or both tubes and pull out the nearest threads. It is a good idea to insert a

Nélaton's catheter between the threads just to keep the way open to the bottom of the cavity and facilitate the instillation of more peroxide of hydrogen. Thanks to the Nélaton catheter, you may within, for instance, five to ten days have removed a great tampon of yarn and tubes, while you still have access to the bottom of the cavity, without causing the patient any pain, and without the least risk of damaging any protecting adhesions. It is a great advantage to be able to remove the drainage material gradually, day after day, so that the viscera may place themselves at the side of one another and the wall of the abdomen proportionately to the pulling out of the yarn. During the after-treatment one has to observe that there must be no retention of pus in any pouch difficult of access, for instance near the spine. The patient may succumb if the viscera have closed over such a cavity, because one cannot diagnosticate the retention of pus.

The wicks absorb during the same time one-sixth to one-fifth more water than the same weight of gauze.[1] During the after-treatment one may make the yarn more hydrophile by instilling glycerin or glucose. When operating in cases of advanced peritonitis, the author inserts a quantity of sterile glucose against the attacked portions of the serosa, in order to excite an abundant secretion.

If one only wants to drain, indiarubber tubes of suitable lumen and the right thickness of wall are to be used. The author especially wishes to accentuate that since he began, about eight years ago, to introduce one or two tubes from the lumbar incision between the liver and the diaphragm, and one in front of the kidney to the neighbourhood of the foramen of Winslow, in every case of peritonitis where there was an exudation round the right lobe of the liver, he has not had to make a second operation for subphrenic abscess on the right side.

There is no difficulty in draining the pelvis through the vagina, or, in the case of male patients, through the ischio-rectal fossa (Langenbuch). Nor is there any difficulty, as just mentioned, in draining the right subphrenic space by means of a lumbar incision. It is very easy to tampon and drain round the ascending and descending colon, and in both iliac fossæ and forwards round the urinary bladder, and even to drain by tubes downwards along the walls of the pelvis, and then to let out all these wicks and tubes and thin indiarubber tissue through the lumbar incision just mentioned, lengthened across the iliac fossa, or to let the tubes out from the pelvis immediately above the urinary bladder and the symphysis through a median incision. On the other hand, it is very difficult to drain in the centre of the abdomen without damage to the intestine. There are cases where it is best to leave the whole median incision open.

[1] According to researches made by Dr. Hj. Ohrvale, Professor of Physiology, Upsala.

Where the serosa is infected and inflamed, it should be drained, or tamponed and drained. If a small portion in the periphery of the abdomen is concerned, it is an easy thing to separate it completely from the sound cavity by means of a tampon of yarn and tubes, which can be limited by some catgut sutures between the viscera or between these and the pieces of indiarubber tissue just mentioned that are placed along the parietal peritoneum. If a great part of the peritoneal cavity is affected, it is important to remove the toxins by draining as much as possible. By furnishing the body during the operation and afterwards with as much fluid as the condition of the heart and kidneys permits, one may in favourable cases induce a peritoneum that before the operation had absorbed everything ("peritonitis sicca"), to secrete a rich exudation through the drainage tubes. In many cases the American "cigarette drains" are excellent.

The position of the patient after the operation has to be chosen chiefly with respect to the drainage. In case of spreading peritonitis the most suitable position is a nearly sitting one, with the foot-end of the bed more or less elevated (15–35 cms.), as already described.

The introduction of saline solution in a vein during the operation.—At every operation for spreading peritonitis, an assistant must be prepared to give, at short notice, an infusion of saline solution (0·9 per cent. of NaCl with 0·3 per cent. of glucose is used in Upsala). The temperature of the solution is about 38°·5 C. The thermometer is attached quite near the cannula. One gives 1–2–2·5 litres, the first half-litre rather quickly, afterwards slower, while the action of the heart is closely observed. It is the accumulation of the blood in the viscera of the abdomen that is the most important indication for an immediate infusion into the veins. If a small pulse does not improve, as soon as the abdominal incision is made, an infusion into a vein is administered. If the coils of the intestine protrude, or if one has to place them extra-peritoneally, the thing is to keep the viscera and the cavity warm, and to give saline solution into a vein at the same time. If necessary, strychnine or caffein is administered.

Irrigation of the peritoneal cavity.—Saline solution is used (0·9 per cent.) of 39°–40°–42° C., at a low pressure, and is allowed to flow away freely.

The peritoneum, when it is healthy and even just after it has taken ill, absorbs the artificial serum very quickly. It is not to be doubted that the microbes by means of the irrigation may be forced straight into both veins and lymphatic vessels.

The author always irrigates in case of universal or very widespread purulent peritonitis where the presence of a copious liquid exudation manifestly shows that the absorbing faculty of the peritoneum is little or none; but not before he has removed the source of infection, if this has been possible. Under such circum-

stances, a copious irrigation with warm artificial serum under low pressure is a gentle way of removing toxins and microbes. In other cases the author tries to wipe up all pus and contents of the intestine as may have escaped by means of compresses moistened in saline solution and then wrung out. After this has been done, one may sometimes, while tilting the table and the patient as is found most suitable, advantageously wash out the *infected* part of the peritoneal cavity, which has previously been wiped.

It is necessary to irrigate if one has been obliged to extrude the small intestine. After one has mopped the cavity everywhere and taken all pains to reach all purulent cavities, more or less hidden at the root of the mesentery, one washes incessantly every portion of the intestine and the peritoneal cavity as being the only means to keep them warm or to prevent them from getting dry.

The author also thinks it a duty to wash with saline solution between the intestinal coils in the centre of the abdomen in cases of appendicitis with diffused sero-purulent peritonitis. After the more affected right part of the peritoneal cavity has been cleansed very carefully, one washes with great quantities of saline solution between the different coils of the small intestine and round the root of the mesentery. The cannula is introduced through an incision below the left edge of the thorax or through a median incision, and the body of the patient is tilted over in such a position that most of the solution can pass across to the right iliac fossa. Only in this way is it possible to make the centre of the abdomen sufficiently clean between the folds of the mesentery and thus to prevent the formation of abscesses between the coils of small intestine.

If experiments show that the washing of the peritoneal cavity with saline solution always produces a considerably increased leucocytosis (v. Mikulicz, Miyake), one will not have to fear so much in future as now, when treating a purulent peritonitis, a washing of surrounding sound regions of the peritoneal cavity. On the contrary, after the diseased cavity has been previously cleansed as well as possible, such a washing may be considered as a preventive against the spreading of the peritonitis by, for instance, acute lymphangitis of the serosa.

As for so-called *abdominal empyemata* and other old purulent encystments in the abdomen in patients who are very exhausted, the author has recently thought it better to open them by one or two very small incisions. One lets the pus flow out very slowly, without the least pressure on the walls of the abscess. When the stream of pus begins to grow less, liquid vaseline of a low fusing-point (36° to 40° C. at the utmost) is slowly introduced now by one incision, now by the other. The vaseline is sterile and the bacteria do not grow in it. It is not poisonous, because it is impossible to absorb it. It should cover and protect the granula-

tions and thereby prevent or lessen both bleeding and absorption. (The author takes the liberty of calling attention to the formidable bleedings from the granulations in old peritoneal abscesses.) A highly absorbent dressing is put on. Every day fresh vaseline is infused until the suppuration has ceased. It is probable that more extensive incision will be required later, but this will be performed under more favourable circumstances. Then one should be able to remove any remaining vaseline by means of a lengthy irrigation with saline solution of a temperature of 40° to 42° Celsius (low pressure). If any vaseline remains it will probably become encysted or permeated by connective tissue. This treatment, however, is only a theory of the author's and has not yet been tried.

The author has great confidence in an "irrigation from within outwards" during the after-treatment, that is to say, tamponing and draining of the diseased regions accompanied by a copious supply of liquid in all ways (intravenously, per rectum; subcutaneously, per os), in order to produce a copious secretion through the wound from both the abdominal and intestinal walls.

(*To be continued.*)

CURIOSITIES OF CURETTING, SPECIALLY WITH REGARD TO CANCER.

By Sir Halliday Croom, M.D.

After the many papers that have been written on curettage of the uterus, and especially the exhaustive paper of Dr. Ballantyne some time ago, perhaps the last word has been said on the subject; yet I think that there are some points which still admit of a little discussion. I would not dream of entering upon any question about the indications and method of curettage, but only introduce some cases where unusual and unexpected results have taken place. My desire is to draw attention to some of the difficulties and accidents occurring in curettage, first, in regard to diagnosis of cancer; secondly, in regard to some of the accidents such as perforation; and thirdly, with regard to unexpected and unfortunate results.

First, with regard to cancer, it is impossible for one to read, far less to give a *précis*, of the various opinions that have been held with regard to the causation of cancer. It is somewhat remarkable to observe that, though no subject perhaps has received so much attention from pathologists and clinicians, and though innumerable theories and suggestions have been offered, the views advanced thirty years ago are still in the main those that occupy the field.

Mr. Morris, in his brilliant and charming Bradshaw Lecture

crystallises the matter thus: "It has been unquestionably proved that the tumour germ theory accounts for the origin of many varieties of benign solid tumours, and all dermoids and other cystic tumours, and we must now try and answer the question with which we are specially concerned. Does it not afford the true explanation of the etiology of malignant tumours also? In attempting to reply to this question, it may first be pointed out that regions and organs from which embryonic inclusions are specially likely to occur are also common situations of primary malignant disease. To realise the truth of this statement, we have but to recall the frequency of sarcoma near the ends of long bones, the occurrence of myeloid and periosteal sarcoma and epithelioma in the upper jaw, and carcinoma of the uterus, œsophagus, stomach, rectum, tongue, and mouth. In the lip the line of junction of the skin and mucous membrane is the commonest seat of carcinoma; in the rectum, the parts at or near the junction of the skin and mucous membrane; in the stomach, the pylorus is the chief seat of carcinoma. Such anatomical areas as those just mentioned, like the cervix uteri, are zones of transitional epithelium, and are provided with glands not always of normal functional perfection. In these so-called cancer belts we may expectantly look for tumour germs in the form of isolated congenital nests of embryonic cells."

Though the most ardent advocates of this "tumour germ" theory cannot claim that its proofs are such as to allow us to accept it, in its present form at least, as the absolute explanation of the causation of cancer, still as Mr. Morris has very fully pointed out, this is so far the only theory advanced which, while it escapes some vital objection, explains satisfactorily most of the phenomena of cancer; while, from my point of view, as a clinician, I regard it as one of the theories which gives the operator by far the most hope.

Greatest amongst the initial difficulties in dealing with every case of cancer, but especially with uterine cancer, is unquestionably the difficulty of its early recognition.

Cancer of the uterus is so prevalent, that nearly all general practitioners see at least two or three cases yearly, and it is upon the family physician that we must rely to recognise the early symptoms, and to indicate to the patient the appropriate treatment. Without his assistance, the gynæcologist will almost invariably see the case only when the disease is too far advanced to admit of complete removal of the morbid growth. I think the profession is quite alive to this, and quite alive to the fact that every case should be dealt with immediately a diagnosis is made; but unfortunately the public are not yet educated up to this point, and therefore, alas, the majority, quite the majority, of cancers, especially uterine cancers, only present themselves to the medical practitioner, and afterwards to the specialist, when, if

surgical interference is not absolutely contra-indicated, it offers little chance of even a temporary cure. It must, of course, be that amongst the better educated of our clientele, sometimes signs will be recognised earlier, and have importance attached to them, which amongst the poorer or less educated will not be observed. My own experience of uterine cancer bears this out fully. From a considerable experience of vaginal hysterectomy for cancer, by far the majority of my patients have been private cases, and only quite a negligible quantity were hospital cases, these latter coming to hospital or being sent there when operative interference was hopeless.

Perhaps there is no form of cancer which is less early recognised than this uterine cancer. Mammary cancers, and cancers of all the other various organs of the body, in whichever sex they may occur, are as a rule early seen, and early operated upon; but uterine cancers, giving rise as they do to indefinite pains and discharges and hæmorrhages, are, amongst the common people at least, neglected. I am afraid that this applies to all classes of the community. Certain it is that in an experience of fifteen years in the Royal Infirmary in Edinburgh, I kept a strict list of all my cancers, and I think I am safe in saying that in these fifteen years not more than five patients presented themselves at a period of the disease which gave me the least encouragement to operate.

A very grave responsibility lies at the door of the medical profession for the small progress made in the early diagnosis of uterine cancer and its successful treatment.

Perhaps the earliest amongst the early symptoms to which one attaches importance is hæmorrhage, where it is slight after coitus or the introduction of any instrument. This, I take it, is about as early a symptom of cancer as ever appears. As illustration, let me here give a very striking example of what I refer to.

Case 1.—A well-educated nurse, a widow, and a woman of very large experience, of 47 years of age, came to me one afternoon, and insisted upon my examining her to assure her that there was nothing wrong with her uterus. I did so most carefully, and assured her that there was nothing wrong whatever. The uterus was movable, with only the slightest possible loss of epithelium on the anterior lip, but there was nothing further. I tried to assure her this was the case, and asked her why she suspected anything wrong at all; and she said that on using the vaginal douche two days previously, there had been a little hæmorrhage. Nothing would satisfy her but that I should curette her uterus in the ordinary way, and send the débris to the microscopist for examination, and, to my great surprise, I was told that the specimen showed squamous epithelioma. A second examination followed, and two days afterwards I removed her uterus by hysterectomy, and found in the cavity of the cervix a further indication of cancer. This is certainly the very earliest case that ever came within my knowledge, and shows the great clinical importance that must be attached to early hæmorrhage and

early curetting, and I may add that this is the most successful vaginal hysterectomy I have ever performed, as the patient is still living, years after the operation.

There is a further point on which I should like to say a word, namely, that all too frequent mistake of underrating the significance of hæmorrhages at or near the menopause. It is quite true that the menopause manifests itself in various ways, and specially by hæmorrhage, but it is quite certain that all post-climacteric hæmorrhages ought to be regarded with the utmost care; and I do not think that any considerations of delicacy should interfere to prevent the practitioner who is consulted by a patient with a hæmorrhage after the menopause, from making a local examination, and, if need be, taking a scraping of the uterus. These hæmorrhages late in life, although they are not always malignant, are always suspicious. Though they are sometimes due to the recrudescence of a fibroid, and sometimes to gouty conditions, yet I think no practitioner does his duty by his patient, be she married or a virgin, without settling the question, and being thoroughly satisfied that the condition is not malignant.

We are all aware of the occurrence of senile uterine catarrh, which is sometimes a condition entirely *per se*; but, at the same time, malignant conditions ought in all cases to be rigorously excluded here also, because in some of these cases the catarrh is an early symptom of cancer. Perhaps there is nothing brings greater discredit on a practitioner than to undervalue a post-climacteric hæmorrhage and to temporise until the patient goes to a specialist, who recognises the condition, and, however much he may endeavour to protect the practitioner, is bound to tell the truth.

In this connection I would like to draw particular attention to the frequency with which malignant disease begins, or at all events progresses, after labour. It would drag this paper beyond all reasonable limits were I to refer to cases in point in detail, but I should like to point out here that over and over again, both in private and in the hospital, I have met with women who have been recently confined, or have recently aborted, and who have complained of hæmorrhage for weeks afterwards, and when local examination came to be made it was found to be malignant disease. With practitioners it is frequently the case that a woman after labour is allowed to have hæmorrhages, small in character, for many weeks, without any investigation being made. For my own part, I am quite at one with the American authorities who insist on making an examination periodically after confinement, so as to note the appearance of any lesion that may have followed labour. Kelly advises that every woman after 40 years of age, with a laceration, should be yearly examined with this

object; and Stone advises that all women in whom we have reason to expect the occurrence of cancer should likewise be examined.

I have no intention whatever of embarking upon an essay on cancer, and I do not presume to speak here of the remarkable work of Doyen with regard to cancer, and his discovery of the micrococcus neoformans, because that really has nothing whatever to do with the question of curettage. Nor do I wish to speak of the question of hysterectomy for cancer, because I think,—notwithstanding the adverse criticism that was offered to a paper I read some years ago,—most men are of the opinion now that, except in very exceptional circumstances, hysterectomy for cancer had best be left alone; but there are two points in diagnosis which I think worthy of a moment's consideration.

Of all the signs of cervical cancer, there is none perhaps so classic as that condition where one finds the cervix broken up and lobulated, bleeding freely on touch, and so friable that pieces break away in the fingers. Three such cases it has been my fortune to see. The women who suffered were all relatives of members of the profession. In each of these cases, though apparently to the touch beyond any possibility of operation, and beyond any possibility of doubt as to the nature of the case, when curetted and subjected to the microscope they showed no indications of malignancy whatever, and all these patients are alive. I put this statement on record, not because I want to undervalue the importance of these signs, but in order that I may impress upon you how important it is to subject everything that you find in this way to the microscope. Not only is this necessary in what seems an obvious condition, as in the cases I have described, but in every case where the uterus is curetted for hæmorrhages, I think it is of the utmost importance that the tissues removed should be subjected to the arbitrament of the microscope.

It must strike everyone, after thoroughly analysing his own cases, how little room there is left for absolute symptomatology. The diagnostic symptoms are meagre, and give but small indication of the nature of the disease, hence the value of curettage when there is the slightest uterine hæmorrhage which cannot be satisfactorily explained.

Let me give a striking example.

Case 2.—A patient in good circumstances was sent to me because she had had an incomplete abortion. She had aborted, or thought she had aborted, two months previously, and there had been more or less hæmorrhage ever since. I gave the case very little thought, did what was obvious, curetted the uterus, packed and drained it in the usual way, and, as a matter of absolute routine, sent the débris of the curettage to my friend Mr. Stiles for examination. I forgot all about the matter, and, to my great surprise, I had a letter from him saying that the speci-

men I had sent him was tubular carcinoma. I wrote and told him that he must be labouring under some hallucination, that he must be mixing up some other case, as the lady simply had an abortion. Nothing would satisfy Mr. Stiles but a second curetting. This was followed by a similar result, and on that patient I performed hysterectomy a week afterwards. This patient's uterus was perfectly freely movable. There was the slightest enlargement, but nothing to speak of. The broad ligaments that I put the clamps on were perfectly healthy, I thought, and there was no indication of anything wrong, and yet, on opening up the uterus, the fundus was found to be the seat of well-marked carcinoma.

Here, then, comes just the point, that as far as the microscope is concerned it is difficult, impossible in many cases, to distinguish between the ordinary cancer and the products of pregnancy; the giant decidual cells complicate matters, and many mistakes have occurred in my own experience through this difficulty. I will cite one out of many.

Case 3.—A patient, on whom I induced premature labour, on account of extreme deformity of the pelvis, but without being successful in delivering a living child, became pregnant again, and I told her that she only had a choice between having abortion procured at once and facing Cæsarean section later. She preferred the former, and I dilated her uterus, and again, as a matter of absolute routine, sent the débris to the microscopist for examination, and received the reply, "malignant." As the lady was a young woman in the enjoyment of perfect health, and as the pregnancy had only gone on a few weeks,—three weeks at the outside,—I was sufficiently surprised, but a second examination from the same authority gave the same report. Even with that, however, I did not feel justified in operating. If the cancer was cancer at all, it was fundal cancer, and I thought she could well wait for a month. She went to London, and was there seen by a colleague, who again scraped the uterus, subjected the débris to the microscope, and was told there was nothing at all.

One illustration further.

Case 4.—Some years ago I was asked to see a lady who had been bleeding for some two or three weeks, and who suffered in the middle of the night from profuse hæmorrhage. Finding the uterus slightly enlarged, and apparently containing no foreign body, I curetted and packed it. She was in the hands of a medical friend, and I did not see her again. Having sent the products for microscopic examination, I was very much surprised to find, a week afterwards, that the report of the microscopist was that there was cancer. I wrote this to my friend the doctor, and advised him meantime to say nothing to the patient on the subject whatever. I never heard of the patient again till some years afterwards, when I was asked to take her down to dinner.

It seems to me that in sending these specimens to the microscopists some notes of the clinical history of the cases should always accompany them, and I now, in submitting scrapings, etc., for microscopic examination, send with them, for the guidance of

the pathologist, a report of the condition of the patient from whom they have been taken. I think this is a most important point. It is unfair to the microscopist, and unfair to the patient, to send a mere scraping without a full and careful clinical history of the case as well. In this way, and in this way only, can mistakes, and very serious mistakes, be avoided.

When the cervix presents a suspicious appearance, a wedge-shaped piece is excised, but where symptoms of carcinoma of the body are present, the body is curetted.

In curetting the uterus, it is important that the scraping should be done thoroughly, both laterally and antero-posteriorly. If this thoroughness is not insisted upon, it may happen that, in the case of an early carcinoma, the diseased tissue may be left untouched.

Even the microscope, as I have already shown, is not always absolutely reliable, and even with this means of diagnosis there are obvious sources of fallacy.

The following case is instructive.

Case 5.—The patient was sent to me from the country, with constant hæmorrhage and a very fœtid muco-purulent discharge. Local examination revealed a cervix of the usual length, but somewhat patent. On the introduction of the finger through the os, a rough mass was felt, which bled on touch. A small scraping was made and sent to be examined by the microscope, with the query, "Is this malignant?" and the answer was, "Yes." I removed the uterus by hysterectomy some days afterwards, and found there was no trace of cancer whatever, but only a fungating polypus.

Now the question comes to be, under what circumstances are the microscopical mistakes likely to be made? and although I do not profess to be proficient in the use of the microscope, I think I may put them down as follows. The sources of error may be grouped under two headings:

1. *The presence of decidual cells.*—These may be met with in two classes of cases—(*a*) Imperfect abortions: (*b*) endometritis after childbed. In the first class the decidual cells are met with in clumps, enclosing chorionic villi, which guard the microscopist from mistaking them for cancer cells, which they individually very much resemble. Further, the true alveolar arrangement of cancer is not found. In the second class of cases, the decidual cells are found in small clusters mixed among much glandular tissue. The latter is a reproduction of normal endometrial cells; the former may suggest cancer. The isolated islands of the squamous cells, however, never show a proper alveolar arrangement, and their scattered distribution, with an increased formation of what looks like otherwise normal endometrium, would not justify a diagnosis of cancer, even in the absence of any record of the history of the case.

2. *The presence of glandular endometritis.*—This has certain resemblances microscopically to columnar celled epithelioma of the cervix. A differential diagnosis can always be made when the following points are attended to:—(*a*) The great increase in the number of the glands. This is seen both in cancer and glandular endometritis, but in the latter the increase consists of glands of much the same thickness, with a definite thickness of interstitial tissue between; while in cancer, the glands vary in thickness and shape, and show very little interstitial tissue between them. (*b*) Branching in glandular endometritis is usually dichotomous, and in cancer it is irregular. (*c*) The cells lining the glands in the former form a single layer of normal-looking endometrial cells, except in places where the section is oblique, while in the latter they often form several layers. The course taken by the glands, too, is of importance. In the glandular endometritis, the glands often show a spiral, or even in places a sharp-angled bend, but they go mostly perpendicularly to the cervix; in the latter they are much more irregular, and run anywhere, obliquely, transversely, or vertically. And lastly, with regard to invasion of the muscular coat of the uterus, this occurs in endometritis as well as in cancer, and cannot be very much relied upon.

To these difficulties, of course, there must be added at the same time the fact that a great many specimens of curettings are given to microscopists without any report whatever. Now, in any case submitted for examination for cancer, the clinical history of the case should be given as well; but given the clinical history of the case, and if sufficient care is taken, I think that most pathologists will be prepared to admit that, if the curettings in each case be ample, and all imbedded together for microscopic examination at the same time, even with the slight possibility of mistake, so far as I know, microscopic examination is the only thing upon which we can rely.

The only method of dealing with a suspicious cervix, short of histological examination, is that of the test of sulphate of copper. This was first described by Heitzmann some years ago:—If a pledget of cotton-wool soaked with a 20 per cent. solution of sulphate of copper be applied for a minute or two to a suspicious erosion on the cervix, the cervix will become quite blanched if it is an ectropion; if it is a simple erosion, a thin bluish-white coating will form without hæmorrhage. By repeating this once or twice, the erosion will heal. It is otherwise if the erosion be cancerous. It will then bleed profusely, and bleed on each successive application.

I have no wish to pursue the subject of cancer further, but let me refer now to a case of acquired atresia after curettage.

Case 6.—The patient came to me with menorrhagia. There was no evidence of any fibroid or neoplasm of any kind, simply a somewhat

enlarged uterus. I did the operation and applied the usual iodised phenol. She had been married for some years, and was sterile. She went to her home in Kelso, and wrote to me afterwards to say that she had not menstruated since the curettage,—that is, for two months,—and she was very pleased to know that she was now pregnant, mentioning at the same time that she had suffered very severe pain at the time corresponding to each menstrual epoch. I was asked later by her doctor to see her in Kelso, the pain having become so extreme with no hæmorrhage at all. A miscarriage was thought of. As the pains were violent, she was placed under an anæsthetic, and examined. I dilated her cervix with difficulty, as the canal was quite occluded, and found there was no indication of pregnancy whatever, but only a large accumulation of menstrual blood. In this case the uterus was scraped, and the contents subjected to the microscope, but no trace of pregnancy was found, nothing but blood clot.

Why the stenosis occurred in this particular instance, I do not profess to say, except that there had been perhaps a rather too profuse application of the phenol to the cervix, or the phenol had been unusually strong, and that there had been some considerable endocervicitis as well. I need scarcely say that the *dénouement* was a very great disappointment to the patient, and she has remained sterile to the present time.

Now, with regard to cases of perforation.

Case 7.—I was called to Perthshire to see a patient with a medical man, some years ago. He had used the curette to remove the remains of an abortion at four months, and had perforated the fundus uteri, and when I saw the case, there was a large knuckle of bowel protruding through the orifice in the fundus, down through the cervix. I had some difficulty in recognising the nature of the case, but after doing so I pushed the bowel back through the orifice, through the cervix and through the fundus uteri, and packed the body of the uterus full with iodoform gauze, and, much to my astonishment, the patient made an uninterrupted recovery.

Perforation of the fundus uteri unquestionably happens occasionally in curetting and allied operations. I am not sure that the perforation does not occur quite as often by means of the dilators as by means of the curette. I have seen it occur in both circumstances, and never, except in the case I have already referred to, have I seen any serious results. If everything is done with the utmost antiseptic care, very seldom any untoward accident occurs. The fact is that the main reason why the uterus may be perforated aseptically by the curette is that the interlacing muscular fibres coming tightly together soon close the aperture in the uterine wall. The greatest risk, of course, is incurred in curetting the uterus for septic cases after labour, for if the curette is sharp enough to do any good, it may cut grooves in the softened uterine tissue, and thus open up the lymphatics and promote absorption of toxin; and the fact is that in puerperal cases the finger makes the best curette, whether pieces of placenta are left or not, provided washing and draining are thoroughly carried out as well. Of course perforation of the

uterine wall by the sound is really of no importance at all, because if the sound be clean, the uterine fibres contract so firmly that no untoward result is ever likely to occur. I have met with this accident over and over again without any bad results whatever.

Although in this country there are no records of cases of this sort being attended with serious consequences, such is not the case in America and the Continent. In an interesting paper by Hessert, he records a case of curettage in which there was injury to the bowel which necessitated resection of 4 ft. of intestine; and numerous other cases are recorded in American, German, and French literature where curettage of the uterus has been followed by perforation of the uterine wall, and death from sepsis. Such a case as this is recorded, where Dr. B. Harvey, quoted by Kelly, after dilating, passed a pair of forceps to catch the ovum, and drew out and cut off 6 ft. of bowel, without realising what he had done. Kelly records another case where a medical man attending an abortion used dilators and placental forceps, and pulled down the gut, and went on pulling until he had about 6 ft. of it out, under the impression that it was fœtal intestine. He cut off the gut and sent for help. Needless to say the patient died. Van de Warker reports a case where, after curetting, a piece of bowel was torn across, 4 in. excised, the Murphy button introduced, and needless to say the patient died. And quite a number of cases are recorded where this accident occurred, and where afterwards the abdomen was opened and hysterectomy performed. These sources of accident are not recorded, to the best of my knowledge, in this country, perhaps because here we are not always in the habit of recording our mistakes.

Before concluding this paper, I would like to refer to two somewhat exceptionally curious results of curettage, namely, where the operation had the very opposite effect of what was expected. In most cases of sterility, curettage is undertaken to obviate the hyperæmia and hyperæsthesia of the endometrium, and in both the cases to which I am going to refer hyperæmia and hyperæsthesia were both present, but the result was the direct opposite of what was expected. The cases are as follows:—

Case 8.—A young married lady, æt. 25, with profuse menstruation and marked metrorrhagia, supposed to be the result of a miscarriage, of which, however, I am not certain, was sent to me. I curetted her uterus in the ordinary way, applied an escharotic, and drained. That was five years ago, and since then she has never menstruated at all. I have examined her time after time, and found the uterus diminished in size, something less than $2\frac{1}{2}$ in., but no other change that I know of perceptible. She is otherwise in perfect health. The case, of course, has been a very distressing one, because the patient has lost all power of menstruation, and become absolutely sterile, bringing about the event that I wanted to avoid.

Case 9.—The patient, æt. 40, who had only recently been married, had a miscarriage of three months. The miscarriage was incomplete. She had bled for two months after the miscarriage was over, and was sent to me for treatment. The obvious thing was curettage, which I performed in the ordinary way, with the result that she never menstruated again: the result being, of course, an endless source of annoyance, because pregnancy was to her an important matter, and her menopause has apparently been induced by this interference.

I do not venture to offer a definite explanation of these two cases. They are both very striking and very painful, but it seems to me that the explanation is to be found in the unsatisfactory condition of the endometrium. In both cases the endometrium was thick, villous, succulent, and soft, and perhaps a larger amount of mucous tissue was removed than necessary, and the question comes back as to how the endometrium is reproduced. That brings us back to the old question of how much of the endometrium is lost at every menstrual period.

The striking thing, however, about these two cases, so far as the physical examination is concerned, is that the ovaries, which were distinctly palpable in both cases, became in both cases diminished in size.

It is well known that while interference will sometimes bring about a menopause unexpectedly, mental troubles will also do it, and it is just possible that in these two cases, the shock, if there was such a thing, of the curettage, may have been sufficient to affect the ovaries.

With regard to the second case, one thing is to be noted, that in the patient's family on both sides there is distinct history of phthisis, and it is quite possible that the early development of the menopause may have been due to a condition of superinvolution, which is associated with it.

Perhaps there is no gynæcological operation which is so frequently and successfully performed as curettage, yet, in view of the facts that I have just adduced, it is well to keep in mind that curettage is by no means free of accidents, and must in all cases, especially puerperal cases, be undertaken with extreme care; and in any case, whether puerperal or not, the possibility of an untoward accident must be kept carefully in view. The operation is so easy, and in most cases so safe, that I venture to hope that a *caveat* such as I have just entered may not be without some value.

HYPERTROPHIC PULMONARY OSTEO-ARTHROPATHY, WITH AN ACCOUNT OF TWO CASES.

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(Plates I.–IV.)

It has lately been my fortune to meet with two well-marked cases of this interesting condition, and I propose, first, to describe the features of these cases in detail, and, secondly, to give a review of the present state of our knowledge of the morbid processes upon which the disease seems to be dependent.

Case 1 is that of a boy, A. M., æt. 14, who was first admitted to the Sussex County Hospital on 5th November 1901, suffering from a painful swelling, of two months' duration, above the right knee. This was incised on 12th November by Mr. Willoughby Furner, who found a periosteal sarcoma of the shaft of the femur, and consequently disarticulated the limb at the hip-joint. The boy left hospital on 27th January 1902.

He was readmitted on 29th October 1902, with what appeared to be an enlarged gland in the right groin. This was excised on 8th November, but on microscopical examination the swelling was found to consist of nerve fibres, degenerated blood vessels, muscular and fibrous tissue. There was no lymphatic gland substance present, and no evidence of malignant disease (Report of Clinical Research Association). He returned to the hospital on 14th October 1903, for swelling of the left knee and ankle, of one week's standing. The clinical notes of his case at that time state that: "Patient has had aching pains in the left knee for about a month, especially at night. The left knee is rather swollen and red. It is hot to the touch, and slightly tender on the inner side. The movements are not limited, and do not cause pain except on extreme flexion. Much free fluid in the knee-joint. The left ankle is also slightly swollen. Temperature, 99°·6. *January* 13, 1904.—Circumference of knee, 13½ in. *March* 3.—Has complained every now and then of 'rheumatic' pains, and his wrists have swollen at intervals. The left border of the heart is just external to left vertical nipple line, the right border at the right sternal margin. No bruit in any area. Pulmonary second sound reduplicated. *April* 6.—Since last entry fingers have become clubbed. Although the terminal phalanges are bulbous, they are not cyanosed. Has been put on thyroid extract, without any appreciable benefit. Continues to have rheumatic (?) pains in elbows and wrists." An elder brother had about this time been in hospital for tuberculous testis, and the knee of this patient was at first thought to be tuberculous. The multiple arthritis which followed, which showed no destructive changes, and which was quite unaffected by treatment, put that diagnosis out of court, and the patient was consequently transferred to the medical side, under the care of Dr.

W. A. Hollis. I have to thank Mr. Furner for allowing me access to his case-books.

"*April* 11.—*Left leg*—Knee and ankle affected with a chronic synovitis; much thickening of the synovia, fluid, and pain; also grating sometimes. *Left arm*—Wrist in same condition as joints of leg; elbow painful on movement. *Right arm*—Chronic synovitis of wrist; elbow in early stage. *Abdomen*—Nothing abnormal. *Thorax*—No abnormal physical signs in lungs or heart; apex beat in fifth space in nipple line; marked clubbing of all the fingers and toes; skiagrams show thickening of these phalanges; no alteration in facies, or other indication of acromegaly. *April* 15.—All affected joints are tender to the slightest pressure or movement. Pain wakes him at night. *April* 18.—Cyanosis of finger-tips noted for first time. *April* 20.—Pain relieved by 30-gr. doses of aspirin." (He had previously been treated with urea, thiocol, and cod-liver oil without benefit.) "*May* 9.—All the original pain and tenderness of all joints have recurred, since only small doses (5 grs.) of aspirin have been given. No pyrexia. *May* 10.—After five 30-gr. doses of aspirin all pain and stiffness gone. *May* 18.—No change from Scott's dressing. *May* 21.—Discharged."

On 9th June he was readmitted, when I was house-physician, and I now quote from my own notes. He had been bedridden, and had never been quite free from pain since leaving hospital. On admission, both wrists were hot, swollen, painful, and tender; but there was no flushing of the skin. The distension was due in the main to fluid, but there was also considerable thickening of the lower ends of the ulna and radius, forming a prominence dorsally on the lower part of the forearm, and ending somewhat abruptly about 3 in. above the wrist. The left knee and ankle were in a similar condition, with again no flushing of the overlying skin. There was marked "floating" of the patella, and the circumference of the knee over the middle of the patella was 15 in. Both elbows were in a condition of chronic synovitis, but, unlike the other joints enumerated above, there was at present no acute exacerbation of the arthritis. Gentle movements did not elicit creaking. Both hands and the remaining foot were greatly increased in size, apparently both from thickening of the bones and from effusion of fluid into the small joints of the hands and foot. The thickening of the bones was well seen in skiagrams taken at the time (Plate I.). The skin over the affected joints was of a peculiar transparent waxy pallor, with distended superficial veins showing through it. The clubbing of the fingers has been already mentioned. It differed from any clubbing which I had hitherto seen, in that, although the distal phalanges showed the typical curved nails and clubbed enlargement of the ends of the digits, the fingers increased in size towards their base; so that the breadth of the middle finger at the base of the distal phalanx was 2·2 cms., at the base of the second phalanx 2·4 cms., and at the junction of the upper and middle thirds of the first phalanx 2·7 cms. This held good of all the five digits of both hands, and also, although to a less marked extent, of the toes. Thus about the upper part of the first phalanges there was a bulbous swelling, somewhat similar to the spindle-shaped swelling of rheumatoid arthritis, but shorter, more abrupt, and situated, not at the interphalangeal joints, but proximal to them. The

FIG. 1.

position of the swelling showed that it was not due to effusion into the joints, and skiagrams proved its cause to be a deposition of new bone along the shaft of the phalanges (Plate I.).

There was no hyperextension of the terminal phalanges. No enlarged glands were present, nor was there any enlargement of the liver and spleen. The most careful examination possible failed to detect any physical signs of tubercle or new-growth in the lungs. The position of the heart was unaltered, and the sounds healthy in all areas. Temperature, 100°.

His mother gave me the following history:—Father and mother alive and healthy. One brother has had a tuberculous testis, which was treated at the Sussex County Hospital. A first cousin has tuberculous knee and caries of ribs. There is no history of gout, rheumatism, or osteo-arthritis in any member of the family. The patient did not sweat much at home, except in the foot and hands. "These were seldom very hot, but always clammy, and the foot sometimes quite cold." His appetite had been fairly good; he had no symptoms of dyspepsia. Bowels generally constipated; no history of diarrhœa. "His pain would shift about from one joint to another. One day he would be stiff in almost every joint and be in pain, and a few days later would say that he felt right again." The hip-joint was unaffected. According to the mother, the clubbing of the fingers was noticed by her in the end of October 1903. She saw that the boy was hiding his hands from her. If her story is accepted, the enlargement had escaped notice in the hospital for some six months. There was no history of any acute infection for some years prior to the amputation. The only illnesses his mother remembers were measles and whooping-cough, "as a child's complaint"; she could not give exact dates. There had been no cough or expectoration.

June 11.—Under aspirin, 15 grs. 4-hourly, and lead and opium fomentations, swelling has diminished in all the affected joints except the knee. No cough; no sputum. *June* 13.—Temperature, 98°. No pain in any of the joints. No abnormal physical signs to be made out in the chest, which can now be examined posteriorly. Impaired mobility of all the affected joints. *June* 18.—Temperature, 99°·6. Complaining of pain and stiffness in joints again. No fluid in any, except in knee. *June* 21.—Temperature, 100°·2 at night. Active arthritis, both wrists. *July* 1.—Much better. No active symptoms. Permanent swelling and impairment of movement in the affected joints. *July* 14.—Went home. Since 25th June he had had Tallermann-Sheffield hot-air baths, with seeming benefit. Mobility of joints was still, however, impaired, both to active and passive movements.

On 9th September he was readmitted under Dr. Hollis, for what turned out to be the last time. A fortnight after leaving hospital had slight hæmoptysis, and had brought up a few specks of blood every day since. Joints are unchanged. The clubbing of the fingers and toes, and the enlargement of the superficial veins, are slightly greater. No physical signs of tubercle or new-growth in lungs. Heart unaltered. We had now for the first time some positive evidence of affection of the lungs, and, having regard to the lapse of time from the amputation for sarcoma, tuberculosis was held to be the more likely diagnosis. I shall

now quote very briefly from the lengthy clinical notes taken during this period. *September* 11.—Has brought up a tiny bright red clot. Examination failed to detect tubercle bacilli or tumour cells. *October* 3.—There is distinct impairment of resonance and diminution of breath sounds in right lung posteriorly at level of eighth dorsal spine. The left leg has been fixed in a splint, and is now free from pain. Joints of arms giving him pain from time to time, still sweating copiously, and temperature constantly from 1° to 2° above normal. Sweating is general, but most marked on hands and foot. *October* 6.—Dulness slightly increased. Again slight haemoptysis. *October* 14.—The right lung posteriorly is dull from scapular spine downwards, the dulness being most marked over the scapula. Over this area the vocal fremitus is quite lost, but a slight vocal resonance still remains. The breath sounds are very distantly heard. In front and in axilla physical signs normal. *October* 15.—Exploratory puncture. No fluid found in right pleura. Patient is losing ground. *October* 29.—Same physical signs over right lung. Patient now suffers a good deal of pain in chest. About twice in twenty-four hours brings up a small blood clot. Apex beat now ½ in. external to nipple line. Losing flesh. No enlarged glands. *October* 31.—Severe pain in right chest this morning. Given morphia for first time. There is increased vocal resonance, a few crepitations, and impaired percussion note in third and fourth spaces in front.

November 2.—In above area breathing now is bronchial, and there are numerous medium crepitations heard. Frequent attacks of pain in chest. *November* 4.—Pain and cough continue. No expectoration, except the usual small bright clot. In the third and fourth spaces right lung breaking down in front. Apex beat in fifth space 1 in. external to nipple line, and diffuse forcible pulsation visible in third, fourth, and fifth spaces. A squeaking presystolic bruit in fourth space in nipple line—very localised. Pulmonary second sound accentuated. Repeated examinations of the sputum had been made by Dr. Bushnell and myself, but we had never found tubercle bacilli. It was evident now that the left lung was the seat of a rapidly growing sarcomatous tumour, or tumours. *November* 8.—The right lung is now breaking down rapidly, but patient still expectorating very little. No blood present in stools. Heart as before. Lower edge of liver three fingers'-breadth above the umbilicus. Right pleura explored—four ounces of blood removed. *November* 12.—Left border of heart now 1½ in. external to vertical nipple line. Same bruit present. Friction in right axilla. *November* 14.—Heart is being pushed further and further to the left. Left border now 2½ in. external to nipple line—right border at left border of sternum. Same localised squeaking bruit below nipple; blowing systolic bruit at apex; pulmonary second sound accentuated. Rough creaking friction in right axilla. Anteriorly, the physical signs of excavation in the right lung are hardly so marked as formerly; posteriorly, signs unchanged, there being normal breath sounds and resonance above the spine of the scapula. Liver lower edge two fingers'-breadth above umbilicus, but it is impossible to say whether the organ is enlarged or pushed downwards. No enlarged glands. *November* 15.—Increase of swelling and pain in left knee and ankle. Knee measures 15¼ in. During the last six weeks joint symptoms have been in abey-

ance. *November* 16.—Constant dyspnœa and pain in chest. Patient now has morphia both by day and night. Physical signs unaltered. Wasting rapidly. *November* 17.—Acute dyspnœa; heart's action weaker; temperature now subnormal—it had previously varied from 98°·8 to 100°·8. An attempt to tap the right pleura with a view to relieving the dyspnœa only resulted in the withdrawal of a few ounces of blood, partly already clotted. *November* 18.—Suffering acutely from breathlessness, which is only relieved by morphia. Oxygen gives no relief. Sinking. *November* 19.—Died at 11.45 a.m.

A post-mortem examination was made on the following day by Mr. R. A. Clapham, Third House-Surgeon, from whose notes I have abridged the following report:—

Thorax.—There was a sarcoma of the right lung, apparently originating from the root and invading all three lobes, the whole of the lower and middle and most of the upper lobe. The pleura was extensively infiltrated, and the lung had to be torn from the chest wall. Throughout the growth there were numerous hæmorrhages, recent and old, and the growth was soft and extremely vascular. Below, the growth was partly adherent to the diaphragm, with a large blood cyst situated between the dome of the diaphragm and the base of the lung. Left lung—Fibrous adhesions to chest wall over lower lobe, and some recent broncho-pneumonic patches.

Heart.—Displaced to the left. Muscle pale and rather flabby. Right ventricle hypertrophied and dilated. Valves healthy. Mediastinal glands enlarged, varying in size from hazel-nut to a marble. Sternum, ribs, and vertebræ not involved in the growth. Thymus gland atrophied.

Abdomen.—Liver and spleen showed slight chronic venous congestion—no sarcomatous deposits present. Kidneys and suprarenals healthy. Stomach and intestines healthy. Glands, no obvious change.

Skull.—Cranial bones not thickened. Brain healthy. Pituitary body normal. Thyroid gland of normal size and apparently healthy.

I have to thank Dr. F. G. Bushnell, Pathologist, Stephen Ralli Memorial, Sussex County Hospital, for the following minute account of the special lesions, which he has kindly given me for inclusion in this paper:—

"The autopsy showed symmetrical and general changes in the bones and joints, mainly of a chronic inflammatory character, with clubbing of the fingers and toes. There was no suppuration, no putrid bronchial secretion, no tubercle. There had been degeneration of the vascular sarcoma in the lung, with formation of a blood cyst between the diaphragm and lung, but it was extremely doubtful if septic infection of the cyst had occurred. The growth in the lung was composed of sarcoma cells of marked polymorphous character, with little intercellular substance. The heart, thyroid, pituitary body, kidneys, and intestines showed no abnormalities, and were not microscopically examined.

"Bones.—Phalanges, the articular ends of humerus, radius, ulna, femur, tibia, and fibula, and the astragalus were dissected out by me. In removing them, the hyperplasia of the gelatinous connective tissue was noteworthy, and the clubbing was seen to be due to hyperplasia of the soft parts—fatty and fibrous—of the fingers, and deposition of firm

new bone along the shafts of the phalanges. The other bones were characterised by softness of texture; the post mortem knife could divide them easily. The periosteum was a little thickened, and there was a deposit of new bone along the shafts. No osteophytes were present.

"Microscopical Appearances (thirty-five sections examined).—The femur, tibia, fibula, and astragalus were decalcified with nitric acid, and phloroglucin nitric acid, and sections stained with—(*a*) hæmatoxylin-eosin, (*b*) eosin methylene-blue, (*c*) Kühne's polychrome methylene-blue, (*d*) by Gram-Weigert, Löffler, and Ehrlich's methods for micro-organisms and tubercle bacilli. No micro-organisms were seen, no tubercle bacilli were present. In each case the periosteum was thicker than normal, but its external fibrous and internal cellular layers could be well made out. Osteoblasts were present in numbers, and in places were several layers deep. Perichondral ossification was limited to a mere outlining of the long bones, and endochondral ossification had resulted in an extremely rarefied cancellous tissue. Suspecting a disintegration of bone and calcified cartilaginous substance by osteoblasts, search was made in possible lacunæ, but none were found. Haversian canals were present, with bone cells, the latter formed by the inclusion of osteoblasts within the bone substance. The patella showed marked horizontal and vertical fibrillation of its articular cartilage; numerous cartilage cells were present in each cartilage space from multiplication.

"*Marrow.*—The marrow resembled the yellow variety in all places. It was fatty and congested. Generally speaking, the marrow was of the embryonic or lymphoid character, though giant cells (zooglœic masses) were present. Lymphoid cells, cells with a rim of protoplasm, basophil or oxyphil, or with much oxyphil cytoplasm, formed the bulk of the cells. All transitions from lymphocytes to nucleated red cells were present. No tubercle giant cells, and no caseation or micro-organisms were present in any part examined.

"*Joints.*—The periarticular surfaces were gelatinous. All the joints were examined by sections stained by (*a*) hæmatoxylin-eosin for general changes; (*b*) by Ehrlich and Kühne's methods for tubercle bacilli; (*c*) by Löffler and Gram-Weigert's methods for micro-organisms; and (*d*) by polychrome methylene-blue and neutral orcein for mast and plasma cells.

"*Knee.*—Synovial membrane thickened and showed inflammatory changes, as did the periarticular tissues. Masses of round mononucleated cells surrounded the vessels, which were distended with erythrocytes as in diapedesis. Some vessels contained a few polymorphonuclear leucocytes, but not many were seen. There were many distended capillaries. The tissues were loosely fibrillated and the fibrils widely separated by œdema. Fat cells were present. The villi were swollen, their surfaces richly cellular, the cells in most cases containing large rounded vesicular nuclei with fine chromatic network and granules. The cores of the fringes were œdematous. Other cells were oxyphil, with rounded small nuclei, single or multiple, of varying functional intensity. Mast cells, so often associated with chronic inflammatory lesions, were present in great abundance, and some plasma cells which may have been derived from lymphocytes. The endothelial cells of the lymphatics possessed pale and swollen nuclei, and were proliferated

in places as described in intestinal enteric lesions. Mitoses were not specially examined for and were not seen. Other cells were those of ordinary gelatinous connective tissue. The synovial membrane showed a small coccus singly and in groups, stainable with methylene-blue, without sign of capsulation. It was not seen in Gram-Weigert sections, and as cultures were not made its nature is doubtful. No tubercle bacilli were present, nor tubercles, nor caseation.

"*Ankle.*—Synovial membrane was more cellular than that of the knee in places, but exhibited otherwise no difference in structure.

"*Left elbow* showed similar changes, but the granulation tissue had replaced the normal synovial membrane. It was composed of round cells with many thin-walled vessels, was œdematous in places, without giant cells or caseation. The synovial fringes were very vascular, swollen somewhat, and contained masses of lymphocytes.

"*Left wrist* showed similar changes."

Case 2.—C. W., æt. 42, came up to my out-patient department on 27th April, and was admitted to hospital on 9th May 1905.

Family History.—His mother died, æt. 64, from the effects of a fall; his father, æt. 66, is alive and healthy. He has had two brothers and ten sisters, of whom five died in infancy; one sister died of "dropsy" at the age of 46, and one brother and five sisters are alive and healthy. *Married.*—Has three sons and two daughters alive and healthy. One daughter died of whooping-cough at nine months. Wife has had no miscarriages. No family history of chest or joint trouble.

Personal History.—Has worked in a brewery for twenty years past; previously was a bricklayer's labourer. Drinks his full allowance of four pints of beer daily in the brewery, and also has a pint or two outside. No spirits. Tobacco, 1 oz. weekly. As long as he can remember, fingers have been clubbed. Mother told him that he "was born that way." Remembers having had whooping-cough, measles, and chicken-pox as a child. Hands and feet, he says, remained stationary until two years ago, since when he has begun to have pain therein. No history of arthritis sufficiently acute to lay him up. When 14 years old was going up a ladder with a hod of bricks, when he had a fit of coughing and brought up a large quantity of blood. Has had slight hæmoptysis from time to time since, occurring at least once a week. Last considerable hæmoptysis was seven months ago. Hæmoptysis always worse when he "gets a bit of a cold." When at school he had no cough that he can remember, but ever since the hæmoptysis twenty-eight years ago he has had a cough and spit, worse in winter, and becoming progressively worse year by year. Spit is yellow; "when I bring a lot up it is more of a darker yellow and like the froth of beer." Sometimes sputum has "a nasty smell." At times cough has caused him to go off work for a week. Fifteen years ago had influenza, and was laid up for thirteen weeks. Cough has been much worse since then, and he has had paroxysms of coughing and expectoration in the mornings. Sweats copiously all over body, most in daytime. Sweating is most profuse on feet and hands, especially on soles and palms. No wasting of muscles has been noticed. Appetite is good. "Middling thirsty." Bowels move daily. For three summers has had an attack of diarrhœa "each

fruit season"—attack lasting seven to nine days. No change noticed in face or ears. Legs below knee have at times "been numb in the morning until I got about on them." No pain except in joints. Has had swelling of feet for a day or two at a time, preventing him from lacing his boots tightly; now and again could not put on his boots. Has worn "eights" now for eight years past; previously had worn "sevens." No smaller size since he reached manhood. Denies syphilis or gonorrhœa.

Present Illness.—A fortnight after Christmas, had "a cold," which laid him up for six weeks. Had some hæmoptysis then. When he got up, found that left shoulder was stiff. He waited a month, and then, as the shoulder was no better, he came up to the hospital for advice, and the casualty house-surgeon, Mr. H. B. Walters, sent him on to me.

State on Examination.—He is a fairly healthy-looking man; of average development; nutrition fair only. No obvious morbid appearances, save the enlarged extremities and the spinal curvature. Height, 5 ft. 5 in.; net weight, 8 st. 3 lb. Colour good. No enlargement of facial or cranial bones. Large prominent ears, but these apparently are not pathological. Nose of ordinary size and shape. Skin healthy. Hair brown, rather dry; fair crop, no white hairs. Temperature, 98°.

Alimentary system.—Tongue clean, of normal size and shape. Some carious teeth. Gums healthy, and of good colour. Stomach of normal size. Splenic and hepatic dulness normal, except that upper part of liver dulness is obscured by the emphysematous right lung.

Hæmopoietic system.—No enlarged glands. Thyroid can just be felt.

Blood count.—Red corpuscles, 5,200,000 per c.mm.; white corpuscles, 12,000 per c.mm. Hæmoglobin (Gowers'), 87 per cent. Differential count of 100 white corpuscles. Polymorpho-nuclears, 71; lymphocytes, 20; large mononuclears, 7; eosinophiles, 2.

Respiratory system.—Patient is round-shouldered, and thorax is asymmetrical, the left side being smaller than the right, with very marked falling-in below the left clavicle. There is a moderate degree of scoliosis present, the convexity of the curve being to the right in the upper dorsal and to the left in the lower dorsal region. Epiglottis, of normal size. Respirations, 20. Left lung.—Expansion poor. Posteriorly, the note is greatly impaired from apex to base, in parts being absolutely dull and toneless. The breath sounds are cavernous in type, with bronchophony, passing into amphoric type, with whispering pectoriloquy at the base. No accompaniments present, except at base, where there are coarse bubbling râles. In the axilla the note is also dull; the breath sounds are obscured by accompaniments, coarse consonating crepitations and grating pleural friction. Anteriorly there is a flat boxy note to percussion, of drummy hyper-resonance in places. The breath sounds in the first and second spaces are bronchial, with fine crepitations in inspiration; below, they are obscured by creaking friction and coarse crepitations. Vocal thrill and resonance increased all over. Right lung.—Expansion fair. At extreme base there are medium crepitations and bronchial breathing, which is not conducted, for the note is somewhat impaired and the vocal resonance

is increased. Many cooing and sonorous rhonchi present, especially over lower lobe. Except at base, the note all over is hyper-resonant, and the breath sounds harsh vesicular, with prolonged expiration. Sputum.—In amount varies from ½ oz. to 2 oz. in twenty-four hours, but that is not the total amount, patient swallowing some. Faint heavy odour, not fetid at present, does not separate into layers, in the main is composed of pus, and occasionally is faintly stained by altered blood. Microscopically, pus cells are very abundant; examinations by Dr. Bushnell, the house-physician Mr. J. B. Stephens, and myself, failed to find tubercle bacilli. Dr. Bushnell isolated the diplococcus pneumoniæ.

Circulatory system.—Heart.—Powerful impulse visible in left axilla over wide area. Apex beat in sixth space 3½ in. external to the vertical nipple line, and 11½ in. external to the mid-sternal line. The left border is in the mid-axillary line, the right border (?) at left border of sternum, but neither it nor the upper border can be determined with accuracy. Heart sounds all over are of good quality and intensity, pulmonary second sound slightly accentuated. Pulse.—90, regular in time and force, good volume, normal tension, artery wall moderately sclerosed.

Genito-urinary system.—No subjective phenomena. Urine for twenty-four hours has varied from 34 oz. to 57 oz. Clear amber; no deposit; acid, sp. gr. 1018; no albumin or sugar. Phosphates not deposited on boiling. Estimation by the house-physician showed 1·8 to 2·4 grms. P_2O_5 excreted daily. Indican, no reaction present. No abnormality of external genitalia.

Nervous system.—Intelligence rather dull. Superficial and deep reflexes all normal. No local atrophy of muscles. No tremor. Sensation normal. Optic discs healthy.

Locomotory system.—Upper extremities.—Hands.—The fingers are long, without any enlargement of the interphalangeal joints. Extraordinary clubbing of the last phalanx of all ten digits, the phalanx forming a knob at the end of the digit. Well-marked hyperextension of the terminal phalanx as originally described by Marie. The nails are broad, convex dorsally, and very incurved at their free ends, thus approximating to the so-called "parrot-beak" appearance. They show longitudinal striation, with a tendency to chipping-off laterally. The colour of the finger-tips and of the nails is good, there being no cyanosis, but the ends of the nails show the rosy hue described by Marie. Although the nails are broad, the lateral borders of each nail anterior to the root are concave, thus leaving uncovered an arc of a circle of the bed. The exposed surface is covered by epidermis, and is not "quick" (Plate II.). This appearance I have never seen before, nor can I find it recorded in any of the published cases of pulmonary osteo-arthropathy to which I have had access. It is not shown in any of the photographs of other cases which I have seen, nor does Marie draw attention to it in his original description. The patient considered that it was a loss of nail substance owing to tearing of the nails by sacks, which he handles at his work. This hypothesis of the causation may be put out of court, for not only is the condition absolutely symmetrical on the thumbs and fingers, but the deficiency is present to

an even more marked degree on the toes (Plate III., Fig. 1). The finger-nails do show signs of loss of substance in the splinters which are seen there, but there is no evidence of such in the toes. From the appearance of the toe-nails, I am of opinion that the condition is really due to a disproportionate hypertrophy of the parts, the pulp of the finger, and the nail bed, *i.e.* the part anterior to the lunula, growing more quickly than the nail itself, and the lateral portions of the matrix becoming covered with the ordinary epithelium of the epidermis as they are left unprotected by nail. The lunule is visible in all the nails of the hands. The left little finger is the seat of a deformity owing to a beer-barrel falling on it three years ago. The first phalanx is partially dislocated outwards and backwards upon the head of the metacarpal. Extension is unimpaired, but flexion is poor, especially in the first interphalangeal and in the metacarpo-phalangeal joints. Hand proper. —The heads of the metacarpals are somewhat prominent, otherwise there is nothing abnormal to be seen. There is no enlargement of the metacarpus and carpus, as in the boy's case. No atrophy of the short muscles of the hand. There is very excessive sweating of the fingers and hands, especially marked on their flexor aspects. Wrist.—There is noticeable enlargement of the lower ends of the radius and ulna, especially of the left hand, but not nearly to the degree met with in the boy's case. In the other bones and articulations of the upper extremity there is nothing abnormal to be made out by any method of examination. The stiffness of the left shoulder is apparently purely muscular and fibrous. (The adhesions were broken down under an anæsthetic on May 18, and now, May 24, movement is fairly free.)

Lower extremities.—The toes show analogous appearances to the fingers. The narrowness of the nails as compared to their beds has been noted above. The curving of the nails is very marked; they are long, and are closely applied to the plantar surface of the distal phalanges. There is no dorsiflexion of the distal phalanges. There is distinct swelling of the foot proper, apparently in the main bony. The lower ends of the tibia and the fibula are enlarged, but there is not sufficient thickening of the lower end of the leg to give the "elephant's foot" deformity. Perspiration is even more excessive than on the hands. In the other bones and joints of the lower extremity there is nothing pathological.

I have referred to the spine under the heading of the Respiratory System, because I consider the scoliosis much more likely secondary to the contraction of the left lung, and not due to a disease of the vertebral bones or joints.

MEASUREMENTS.

Upper Limbs.

Volume of Hand up to 2 ins. above Styloid Processes of Ulna and Radius (by Volume of Water displaced)—

Right—16 oz. 4 drms. *Left*—17 oz. 2 drms.

	Right.	*Left.*
Lower crease of wrist to tip of mid finger . .	7 1/8 in.	7 1/8 in.
Maximum breadth of palm	3 5/8 ,,	3 3/4 ,,
Breadth at base of fingers	3 1/2 ,,	3 3/8 ,,

	Right.	*Left.*
Breadth of wrist	$2\frac{3}{4}$ in.	3 in.
Circumference of hand (maximum)	9 ,,	$8\frac{7}{8}$,,
,, ,, ,, at base of fingers	8 ,,	8 ,,
,, ,, wrist	7 ,,	$7\frac{1}{4}$,,
,, ,, elbow	9 ,,	9 ,,
,, ,, forearm at middle	$8\frac{1}{2}$,,	$8\frac{1}{4}$,,
,, ,, ,, 2 in. above wrist	$7\frac{1}{8}$,,	$7\frac{1}{4}$,,
Length of thumb, palmar crease to tip	$2\frac{5}{8}$,,	$2\frac{3}{4}$,,
,, ,, first finger, ,, ,,	$3\frac{1}{4}$,,	$3\frac{1}{4}$,,
,, ,, second ,, ,, ,,	$3\frac{3}{4}$,,	$3\frac{1}{8}$,,
,, ,, third ,, ,, ,,	$3\frac{1}{2}$,,	$3\frac{1}{4}$,,
,, ,, fourth ,, ,, ,,	$2\frac{7}{8}$,,	$2\frac{7}{8}$,,
Circumference of first phalanx of middle finger (maximum)	$2\frac{3}{4}$,,	$2\frac{5}{8}$,,
Circumference of first phalanx of thumb (maximum)	$3\frac{1}{4}$,,	$3\frac{1}{4}$,,
Breadth of nail of first finger (maximum)	$1\frac{1}{8}$,,	1 ,,
,, ,, thumb ,,	$1\frac{1}{4}$,,	1 ,,

LOWER LIMBS.

Volume of Feet up to 1 in. above Level of Tips of Malleoli (by Volume of Water displaced)—

Right—43 oz. 6 drms. *Left*—44 oz. 5 drms.

	Right.	*Left.*
Anterior superior spine to internal malleolus	33 in.	$33\frac{1}{2}$ in.
,, ,, ,, inner condyle	18 ,,	$18\frac{1}{4}$,,
Inner condyle to internal malleolus	15 ,,	$15\frac{1}{4}$,,
Circumference of knee-joint	$13\frac{3}{4}$,,	$13\frac{7}{8}$,,
,, ,, calf	$11\frac{1}{4}$,,	$11\frac{3}{4}$,,
,, ,, ankle round heel	$13\frac{1}{4}$,,	$12\frac{7}{8}$,,
,, ,, ,, at malleoli	$10\frac{1}{2}$,,	$10\frac{3}{4}$,,
,, ,, middle of foot	$9\frac{3}{4}$,,	$9\frac{3}{4}$,,
,, ,, foot at base of toes	$8\frac{3}{4}$,,	$8\frac{5}{8}$,,
Length of great toe	$2\frac{1}{2}$,,	$2\frac{5}{8}$,,
Circumference of great toe at first phalanx	$3\frac{7}{8}$,,	$3\frac{7}{8}$,,
Breadth of great toe at first phalanx	$1\frac{3}{4}$,,	$1\frac{7}{8}$,,
Breadth of nail of great toe	$1\frac{3}{8}$,,	$1\frac{3}{8}$,,

THORAX.

In horizontal nipple line during deep inspiration	$17\frac{3}{4}$,,	16 ,,

Skiagrams of this case in most respects resemble those of the boy. There is the same deposit of new bone along the shafts of the phalanges, and thickening of the lower ends of the ulna and radius, and tibia and fibula. In all these bones there was, however, less thickening than in the boy's case, and I cannot satisfy myself that there is any thickening of the metacarpals or metatarsals. The terminal phalanges show a most interesting condition. From the borders of the phalanx, and also, although to a less degree, from the anterior and posterior surfaces, there project tufts of spicules of new bone, which thus form a solid groundwork of support for the hypertrophied soft parts (Plate IV.). This new formation is seen in the fingers and thumb only at the ungual extremity of the phalanx, but in the toes is even more noticeable at the base (Plate III., Figs. 2 and 3).

DIAGNOSIS.—The case, then, would seem to be primarily one of

bronchiectasis: of very old standing in the left lung, in which considerable fibroid contraction and consolidation have taken place. The condition, however, is bilateral; the right lung is certainly affected, although to a much less extent, in the main being in a state of complementary emphysema.

General Review.—There are two striking examples of the condition first described by Marie (1) in 1890 as "Osteo-arthropathie hypertrophiante pneumique." Since that date a great many cases have been published in this country and abroad, and a number of these have been tabulated by Janeway (2) and by Wynn (3). Marie published his monograph with a view to avoiding further confusion between these cases and acromegaly, and yet he contrived to make the mistake himself, for Arnold's (4) post-mortem examination of the elder brother Hagner (one of Marie's original cases) proved that his disease was really acromegaly. All the distinctive features of Marie's hypertrophic pulmonary osteo-arthropathy were met with in my two cases; what little fresh I have to record is due, not to any omission on the part of Marie, but to our acquirement since 1890 of the X-rays.

It must always be borne in mind that this form of osteo-arthropathy is not a primary disease of the bones and joints, but a secondary process set up therein as a consequence of disease elsewhere in the body; as Marie has it, "constituant pour ainsi dire un accident au cours d'une autre affection antécédente."

Symptomatology.—From a consideration of the features of the two cases described above, one gets a unique clinical picture, the like of which occurs in no other disease. To recapitulate briefly: There is a symmetrical enlargement of the feet and hands, but not only are these members enlarged, they are also deformed, the different parts not being enlarged in the same proportion. The enlargement affects hard and soft parts alike. There is subperiosteal thickening of the shafts of the long bones, effusion into the joints, and hypertrophy of the soft tissues of the terminal segments of the digits. Thus the fingers were likened to drumsticks by Marie, and the thumb to the clapper of a bell. The nails are quite distinctive, and have been fully described already. There is enlargement of the lower ends of the long bones at the wrist and ankle, with effusion into the joints. Similar changes may be met with in the knee and elbow, and much less commonly in the hip and shoulder.

Spinal curvature is common, kyphosis or scoliosis, but is usually secondary to changes in the lungs or to caries of the vertebræ, and not caused by the characteristic lesions of the disease. Marie held that kyphosis, if present, invariably affected the lower dorsal or lumbar spine, but this distinction has been proved too absolute.

The arthritic changes consist in thickening of the synovial membrane and effusion of fluid into the joint cavity, with or

without ulceration of the articular cartilage. From this and the thickening of the bones of the articulations the movements are impaired, but there is no lipping of the articular surface, far less any true ankylosis.

Pain and tenderness are variable: most cases show little of either, pursuing essentially a chronic course; in others there have been exacerbations of the process, accompanied by both pain and tenderness. Attempts have been made to show a correspondence between these exacerbations of the osteo-arthropathy and exacerbations in the primary pulmonary disease. It is important to note that there is no tendency whatever to pus formation or disintegration of the joint.

The skin over the affected parts shows excessive perspiration, on the dorsal aspect according to Marie, but on the ventral in these two cases.

Muscular wasting is usually present, but is not a marked feature. There is no reaction of degeneration, no fibrillary tremor; the wasting is general, and not localised to certain muscles or segmental groups of muscles, and is merely due to disuse, not to trophic changes. Of negative importance is the absence of any affection of the bones of the cranium and face or of the jaws, a deformity of the upper jaw described by Marie not having been confirmed by later observers.

Various writers have reported other pathological conditions of every system of the body, but none of these are even approximately constant, and would seem to have been mere coincidences. All I need refer to here is that in several cases there has been noted enlargement of the acromial end of the clavicle, of the acromion process and spine of the scapula, and of the crest of the ilium.

The two cases I have described above may be taken as illustrating the two types of the disease as regards its clinical course, the boy being a subacute case, the man a case of the much commoner chronic type. The boy, indeed, was a nearer approach to an acute case than any which I have read or seen,—within six months of the first symptoms of the disease he was practically a helpless cripple, and during the last year of his life he had again and again attacks of subacute arthritis, in which he suffered great pain. In his case the arthritis, in the man's case the osteitis, was the more prominent.

Diagnosis.—The diagnosis rests upon the presence of the characteristic features of the disease enumerated above, and the presence of a primary disease—usually in the lungs. The osteo-arthropathy was present in the boy's case for nearly a year before we were able to diagnose the disease of the lung. In the majority of cases, however, the osteo-arthropathy does not appear until the primary disease has been well established. The man's story that he was born with clubbed fingers may be discredited, but in all probability the condition dates back to infancy or very early

childhood, and the bronchiectasis may have been first set up by whooping-cough or measles. At the same time there is always a possibility of the bronchiectasis being congenital.

The differential diagnosis presents no difficulty. The main points of difference from acromegaly were laid down by Marie as follows. Acromegaly is a primary disease dependent upon disease of the pituitary body, and running a continuous course to a fatal termination. Osteo-arthropathy is secondary to disease of the lungs, its course is liable to intermissions, and it is not fatal in itself. In acromegaly the various parts of the hands and feet are enlarged in the same proportion; in osteo-arthropathy the main enlargement falls upon the fingers and toes, and especially on the terminal phalanges. As Marie says, the hands and feet are not only enlarged, but also deformed. In acromegaly the nails are unaffected. In acromegaly joint affection is rare: in osteo-arthropathy, common. In acromegaly, the face, tongue, lower jaw, genitals, and the cartilages of the ears, nose, eyelids, and epiglottis are enlarged; they are unaffected in osteo-arthropathy. These data are quite sufficient to make the differential diagnosis perfectly clear. One cannot, I think, insist upon enlargement of the carpus and metacarpus being peculiar to acromegaly (cf. boy's case), or give diagnostic importance to the seat of any kyphosis present.

Pathology and etiology are best considered together. By far the most exhaustive account in the literature of this country will be found in Wynn's paper. Marie's name is cumbrous, but it is at least expressive: he bases it partly on the history of his cases, partly on examination of the lungs, and states that "Pneumique comprend ici pour moi non seulement le poumon, mais aussi ses annexes, bronches et plèvres." He thus includes all cases due to bronchiectasis and empyema. His view of the pathology of the condition was that there was first production of toxins in the lungs, followed by absorption of these toxins into the general circulation, and finally selective actions of the toxins on certain bones and joints. This view was supported by von Bamberger ([5]), who held that the essential cause of the osteo-arthropathy was the absorption of chemical toxins from phthisical or bronchiectatic cavities. He endeavoured to produce the disease artifically in dogs by rectal injections of foul bronchiectatic sputum, but a six-weeks' trial of the method proved unsuccessful. So far as I know, his are the only experiments which have been made. Must there then be an additional factor present, predisposing the bones and joints to chronic inflammatory changes?

Godlee ([6]) "regrets the absence of reference to the possible complication with syphilis in the cases recorded," and suggests that some of the cases recorded as osteo-arthropathy were really examples of that form of osteo-arthritis which is associated with chronic septic suppurations, such as gonorrhœa and leucorrhœa, complicated with independent clubbing of the fingers. The

question whether syphilis may be a factor in the disease has been carefully investigated by Wynn, who could find only one undoubted case, that of Schmidt ([7]), whose patient developed osteo-arthropathy during the tertiary stage, and improved somewhat under potassium iodide. There was no evidence whatsoever of syphilis in my two cases. As regards Godlee's second consideration, I would point out that in chronic gonorrhœa and leucorrhœa, drainage of pus, as compared to that pent up in vomicæ or in the pleural cavity, is free. During last winter we had in the wards of the Sussex County Hospital under Dr. Hollis, a labourer, æt. 40, with a general gonococcal infection. This patient had gonococcal pleurisy and polyarthritis of the most persistent character, the arthritis, moreover, affecting both hands and feet; but although we had the man under observation for seven months, there was not the slightest evidence of osteo-arthropathy, nor was there clubbing of the digits.

Wynn believes that infectious diseases "play an important part in predisposing the joints and bones to osteo-arthropathic changes." He cannot, however, show any precise evidence in favour of this hypothesis. Infectious diseases were certainly not a factor in Wynn's own cases, or in mine. A past history of infectious disease, *i.e.* of one or more specific fever, is no doubt present in most cases of osteo-arthropathy, but so it is present in most cases of any other disease, and for that matter in most healthy individuals. There does not seem, judging from the summary of cases given by Wynn and my own investigation of the literature, to be a single recorded case in which an acute specific fever, occurring in the course of a chronic pulmonary disease, was followed by osteo-arthropathy. In Soltau's ([8]) case there was a history of influenza eighteen months previously, no lung disease was found; in Harris's ([9]) case there was also a history of influenza followed by phthisis, and the latter by osteo-arthropathy.

Thorburn ([10]) suggested the name "tuberculous polyarthritis," on the assumption that the disease was "in reality a tuberculous affection of a large number of bones and joints, but that it is of benign type, having no tendency to caseate." The majority of published cases showed no clinical signs of tubercle, and the same holds good of the reports of autopsies, so that Thorburn's view lacks support.

There is no real evidence that the nervous system plays any part in the production of this form of osteo-arthropathy. Möbius ([11]), in a patient with bronchiectasis and clubbed fingers, saw an extreme enlargement of the ends of the two ulnar fingers follow an ulnar neuritis. This is quite an isolated case, and may have been due to vasomotor changes. Farquhar Buzzard ([12]), in a case reported originally by Walters ([13]), found no degenerated fibres in the median, ulnar, sciatic, and anterior crural nerves examined

post-mortem. The disease differs essentially from the arthropathies and osteo-arthropathies of nervous origin, in being hypertrophic, not destructive in nature. In Hirschfeld's [14] three cases there was marked alcoholic neuritis of the legs and arms, but Hirschfeld considered that the enlargement of the extremities was due to vasomotor influences—"dermato-hypertrophia vasomotoria."

Several post-mortem examinations have disclosed changes in the thyroid gland. Thorburn and Westmacott [15] found old tuberculous lesions in the right suprarenal body, Thorburn and Buzzard changes in the pituitary, and Erb (quoted by Marie) described substernal dulness, but there is no record of enlarged thymus being found post-mortem. There is thus no proof of the condition being caused by disease of the ductless glands, no constant changes being present in any.

There is, however, strong evidence that hypertrophic osteo-arthropathy does not always depend upon pre-existing disease of the respiratory system alone. Thayer [16], Janeway, and Wynn have drawn up lists of cases tabulated according to the predominating primary disease. Thayer found such disease to be in the lungs or pleuræ in forty-three out of fifty-five cases, Janeway in sixty-five out of ninety-three cases, and Wynn in sixty-eight out of one hundred cases. In Wynn's series there were thirty-eight cases "who had no pus at any time, and thirty of these had no lung disease. Therefore, if the disease be produced by the action of toxins, either these toxins can be manufactured in the absence of pus, or different toxins having an identical action can be produced by very various processes, and it becomes necessary to search for other factors." Most of these other factors which have been brought forward, I have already discussed: it only remains now to consider what part can be played by the urinary, alimentary, and circulatory systems, for I cannot hold with Wynn that "injury too, though rarely mentioned in the reported cases, should be able to play a like predisposing part."

Urinary system.—Chatin and Cade [17] have published a case in a man the subject of chronic interstitial nephritis, who showed symptoms of uræmia. The patient had had several attacks of acute rheumatism, and was very thin and pale. Unfortunately the writers do not give a detailed account of the state of the heart and lungs, and, considering the nature of the case, one can hardly accept as strictly accurate the bald statement that there was "rien au cœur, ni aux poumons." It is interesting to note that they describe an appearance of the free ends of the distal phalanges of the fingers identical with that of my second case. This they picturesquely compare to the appearance of a bar-magnet which has been plunged into iron-filings. A radiogram is given, and their two cases (*vide infra*) and my own are the only such which I have found in the literature. Chatin and Cade, how-

ever, do not attribute the osteo-arthropathy in their case to the renal disease, but consider it more probably due to the antecedent attacks of acute rheumatism.

No constant changes in the urine have been observed. *A priori*, in a disease such as this, in which there is increased bone-formation, one would expect during the periods of activity a diminution in the excretion of phosphates, but the results of estimations are at variance. Schittenhelm ([18]) in one case saw, between May and July 1901, moderate diminution in the size of the hands. Measurement of radiograms showed that the retrograde change involved the soft tissues almost exclusively. In a metabolism experiment with known phosphorus-nitrogen ratio in the food, he found during a period of fourteen days a normal phosphorus excretion in the urine.

Alimentary system.—Gilbert and Fournier ([19]), and shortly afterwards Frederick Taylor ([20]), described a form of cirrhosis of the liver associated with great enlargement of the spleen, occurring in children, and apparently not caused by alcohol. In this "spleno-megalic cirrhosis," clubbing of the fingers, and, according to Gilbert and Fournier as usually quoted, enlargement of the bones and effusion into the joints, are met with very similar to what is seen in Marie's hypertrophic osteo-arthropathy. According to Rolleston ([21]), "such lesions are extremely rare in biliary cirrhosis, and are not dependent upon pulmonary lesions." Taylor ([22]) states positively that in his case the clubbing of the fingers was due not to a change in the bones or joints, but in the tissues, and he publishes a skiagram in proof thereof. With this type of hepatic cirrhosis I am unacquainted except by reading, and I do not find a perusal of the French cases at all convincing. In Gilbert and Fournier's original series, clubbing of the fingers was present in three of the seven cases. Of these three cases, in the first only was there joint effusion—in the knee. The child had had measles at two years, but on examination there was nothing abnormal made out in the lungs. In Case 2, the child had a chronic cough, and there were physical signs in the left lung suggestive of tubercle. Case 3 had congestion of the lungs in infancy, but the present condition of the lungs is not given. In none of these cases was bony enlargement confirmed by radiography, and the writers state that they would be tempted to suggest that the clubbing was due to upward displacement of the diaphragm by the enlarged abdominal organs, and consequent diminution of the respiratory surfaces, were it not that in Case 3 the liver and spleen were not greatly enlarged. Gilbert's second paper, in collaboration with Lerebouillet ([23]), is even less convincing. Case 1, when first under observation, had no clubbing of the fingers, but, seen later, having had respiratory troubles in the interval, clubbing was present. Radiograms are given, and the sole evidences of bony enlargement are an exostosis of the terminal

phalanx of the right index finger, and a slight enlargement of the ungual extremity of the distal phalanx of the left thumb, which "does not seem to exceed notably what is seen in radiograms of the normal hand." Of this case the writers conclude: "Les lésions osseuses sont en tout cas minimes." In Case 2, they found by post-mortem dissection of the parts that there was only a hypertrophy of the soft tissues, the bones being absolutely normal. In Chatin and Cade's second case, the patient—a man of 50—had cancer of the head of the pancreas, and secondary obstructive jaundice from pressure on the common bile duct. During the course of the disease a moderate degree of clubbing of the fingers developed, and skiagrams showed the free end of the distal phalanx of the index middle and ring fingers studded with osteophytes. These cases, and there are others in the literature, would seem to prove that hypertrophic osteo-arthropathy may be caused by the absorption of toxins formed elsewhere than in the lung, and especially is this the case if one accepts the view that simple clubbing is the precursor of the former condition.

Wynn suggests that in nearly all the recorded cases of hypertrophic osteo-arthropathy there is a common factor present, namely, auto-intoxication from the alimentary canal. In my second case there may be such auto-intoxication, for the man habitually swallows part of his sputum, of which his alimentary canal would seem to be remarkably tolerant.

The circulatory system.—The majority of well-marked cases of hypertrophic osteo-arthropathy would appear to occur in bronchiectasis, chronic phthisis, and empyema, all diseases in which there is increased strain thrown upon the circulatory system. In hypertrophic cirrhosis of the liver there must be increased work thrown upon the heart in maintaining the circulation through that organ, and consequently, unless there is sufficient reserve power in the heart, the general circulation must in turn suffer. Granted, then, that the circulation be embarrassed, sluggishness of the blood current will be especially found in those parts furthest distant from the heart, and, since the circulation is slowed there, it is on these parts that toxins in the blood would have most prolonged action, and would be able to exercise most effect, provided the tissues were susceptible to their action. One thus arrives at a plausible explanation why the ends of the fingers and toes are especially affected. To my mind this seems the most rational explanation of the pathology which can be offered at present. It is confirmed by the close relation between simple clubbing and hypertrophic osteo-arthropathy. No sharp line can be drawn between these two conditions. They are met with in precisely the same class of diseases. In osteo-arthropathy the fingers and toes are invariably clubbed, and in some cases the clubbing has been seen to precede the bone and joint changes. Others which on ordinary examination appeared to be cases of

simple clubbing, have been found post-mortem, or on radiographic examination, to have thickening of the bones (*e.g.* Cases 8, 9, and 11 of von Bamberger's series). Thus hypertrophic osteo-arthropathy is intimately connected with the clubbing of congenital heart disease. This was recognised by Marie, who evades the difficulty rather ingeniously, as the following quotation shows:—"On remarquera cependant que la cyanose congénitale se termine fréquemment par la tuberculose pulmonaire." But all cases of congenital heart disease with clubbing do not die of pulmonary tuberculosis, nor is there any constant relation between the cyanosis and the clubbing. There may be clubbing without cyanosis, and cyanosis without clubbing. Cyanosis is not characteristic of the fingers and toes in hypertrophic osteo-arthropathy. Yet the presence of the latter condition in diseases in which there is prolonged venous congestion seems to me to be more than a coincidence. Béclère ([24]) has reported the case of a patient suffering from aneurysm of the third part of the right subclavian artery. The left hand was perfectly normal. The fingers of the right hand were clubbed. The pressure on the veins was not sufficient to cause œdema or change of colour when quiet, but on use of the arm the hand became cyanosed. Wynn, who quotes other cases, is of opinion that the enlargement of the fingers was œdematous, and not true clubbing. In clubbing, whether there be bony enlargement or not, the greater part of the swelling is usually due to hypertrophy of the soft tissues, and particularly to an increase in the fat, in itself an evidence of diminished oxygenation. My first case is a manifest exception to the rule laid down by Wynn, that even where bony enlargement is present, "the terminal phalanges are much longer than the others which have greater increase of bone." Freytag ([25]) has described great distension of the capillaries in the bed of the nail. In one of Thorburn's three cases of hypertrophic osteo-arthropathy the boy had mitral stenosis and clubbing of the fingers. There was no disease of the lungs, and the thickening of the lower ends of the long bones at the wrist and ankle was confirmed post-mortem. Samuel West ([26]) has made a special study of clubbing of the fingers, and holds that, although it is often associated with disease of the chest obstructing the circulation, nothing is known of the cause in general. He cites cases occurring in individuals apparently quite healthy, and other cases in which the onset was so sudden that the enlargement must have been vascular in origin. West considers that osteo-arthropathy may be divided into two groups. His first group he makes up of cases in which, with clubbed extremities, there is swelling in or round the joints, but no bony lesions. These cases he compares to gonorrhœal rheumatism, and thinks that they are probably due to absorption of toxins. In his second class the cases show extensive changes in the shafts and articular ends of the bones, and are, he says, so

rarely associated with chest lesions that such association may be merely accidental. He inclines to think that the true cause may be tubercle or syphilis—thus coming into line with Thorburn and Godlee, to whose views I have already referred. Godlee, in Fowler and Godlee's work on the lungs ([27]), goes even further, and holds that "it is impossible to distinguish many cases of pulmonary osteo-arthropathy" from tubercular or syphilitic bone and joint lesions and osteo-arthritis. While one is bound to respect the opinion of such eminent authorities, my sympathies are with Marie in his view that the changes in osteo-arthropathy are distinct from those of any other affection.

Dr. John Thomson writes to me that his belief is that pulmonary osteo-arthropathy is an entirely different affection from clubbing of the fingers, but until a case is found of osteo-arthropathy without clubbing, or until a definite and distinct causation is found for the two conditions, it seems to me right, in view of their intimate clinical relation, to regard them as different stages of the same process. Clubbing is not œdema, and is but seldom associated with œdema. I cannot see, however, that this negatives the point at issue, as some authorities maintain. Complete stasis is much less likely to cause the lesions of hypertrophic osteo-arthropathy than a sluggishness of the circulation, which continues to bring fresh supplies of toxins to the parts, and at the same time affords them, when there, more time to exert their special action upon the tissues. The result of that action is hypertrophy of the tissues, and venous congestion, artificially produced, has been used in surgery to promote regeneration and hypertrophy.

These are the main facts that can be brought forward in an attempt to prove that obstruction of the circulation is a factor in the causation of hypertrophic osteo-arthropathy. Should the results of the blood-count from the finger-tip of the second case be confirmed by later examinations which I intend to make, they will afford important confirmatory evidence. Such an explanation of the pathology cannot, however, hold good of all cases, for in many there was no disease of the heart found either clinically or post-mortem, and in some there was no apparent cause of embarrassment of the circulation, nor was there any evidence of such embarrassment. We cannot at present determine accurately the exact pathology of the disease.

Pathology of my own cases.—In Case 1 the true pathology can be only a matter of conjecture. The latest views of the metabolism of malignant tumours do not support the hypothesis that morbid products are introduced therefrom into the circulation. Yet the case is typical of hypertrophic osteo-arthropathy, although there was no pus or decomposing or necrotic tissue present in the body, and although at the time of onset of the symptoms there was cause of obstruction of the circulation, the heart being healthy

and in its normal site, and the soft fleshy tumour in the interior of the lung forming no embarrassment to the circulation. The case may have been further complicated by rheumatism, but no bacteriological examination of the blood was made, our pathological laboratory not being in existence at the time. I would again draw attention to the fact that the beginning of his illness was the periosteal sarcoma.

In Case 2 the pathology to my mind is clear. The case corresponds exactly to Marie's original description. There are numerous badly drained vomicæ in the right lung from which toxic infection of the blood ensues, and I would suggest that the obstruction to the circulation by the displacement of the heart and the condition of the lungs is sufficient to account for the main localisation of the lesions at the extremities.

Nomenclature.—Marie's name, although unwieldy, gives us in three words the essentials of the disease, as usually met with clinically. "Secondary hypertrophic osteo-arthropathy," the term first suggested by Massolongo ([28]), and adopted by Thayer and Wynn, is no shorter and is less definite than Marie's original title, but it gets over the difficulty that in some cases no pulmonary disease has been found. Other names which have been suggested are "Hyperplastic osteo-arthritis" (Walters); and "Secondary hyperplastic ostitis" (Arnold), and "Toxigenic ossifying osteo-periostitis" (Sternberg ([29])), neither of which includes the changes in the joints. Owing to the site of the primary disease in my two cases, I have preferred to publish them under Marie's original name.

Treatment must of course be directed towards the primary disease. Gillet ([30]), Moizard ([31]), Moussons ([32]), Godlee, and others have reported cases where simple clubbing diminished or disappeared after successful treatment of the primary disease, usually empyema. It may be that the bony changes, in their early state, are also susceptible to treatment, but once well established they are permanent. In one case special treatment would seem to have been attended with a measure of success. Demons and Binaud ([33]) have observed considerable improvement in a patient treated by subcutaneous injection—during several months—of tissue extract from the lungs of healthy sheep. The rationale of such treatment does not seem to me sufficiently clear to warrant its adoption. During the periods of exacerbation treatment of the osteo-arthropathy itself may give relief to the patient's pain, but is palliative only, and cannot in any sense be held to be curative. As a rule, the bones and joints give little trouble, their symptoms being of quite secondary importance compared to those of the primary disease.

I have to thank Dr. W. Ainslie Hollis for his kindness in allowing me to publish the first case. My thanks are also due to Mr. Geoffrey Bate, M.B., for the two photographs of the second case.

DESCRIPTION OF PLATES I.–IV.

Plate I.

Palmar surface of left hand and wrist from Case 1. Shows enlargement of fingers, metacarpus, carpus and wrist, as described in the text. The nails are visible on thumb and index finger. Note subperiosteal sheaths of new bone on middle and proximal phalanges, metacarpals, ulna and radius. The carpal bones are separated by effusion of fluid into the small joints. The epiphyseal lines are shown.

Plate II.

Right hand and wrist from Case 2.

Plate III.

Fig. 1.—From a photograph of right foot of Case 2, to show the toes and nails. Note the uncovered portions of the nail-beds.

Fig. 2.—Radiogram of left hallux from Case 2—plantar surface, natural size. To illustrate especially the new bone formation in the distal phalanx. There is also some thickenings of the first phalanx.

Fig. 3.—Skiagram of one finger from Case 2. Shows the bulbous hyper-extended distal phalanx, the outline of the nail, and the bony thickening.

Plate IV.

Skiagram of palmar surface of left hand from Case 2. Shows the length of the fingers, deposits of new bone at ungual enlargement of distal phalanges, and along shafts of middle and proximal phalanges, especially the latter; also enlargement of lower ends of radius and ulna. Contrast metacarpal bones and small joints of carpus with those of Case 1 shown in Plate I.

REFERENCES.

1. Marie, *Rev. de méd.*, Paris, 1890, tome x. p. 1. 2. Janeway, *Am. Journ. Med. Sc.*, Phila., 1903, vol. ii. p. 563. 3. Wynn, *Birmingh. Med. Rev.*, 1904, March–May. 4. Arnold, *Beitr. z. path. Anat. u. z. allg. Path.*, Jena, 1891, Bd. x. S. 1; *Virchow's Archiv*, Bd. cxxxv. S. 1. 5. v. Bamberger, *Ztschr. f. klin. Med.*, Berlin, 1891, Bd. xviii. S. 193. 6. Godlee, *Brit. Med. Journ.*, London, 1896, vol. ii. p. 118. 7. Schmidt, *München. med. Wchnschr.*, 1892, Bd. xxxix. S. 663. 8. Soltau, *Trans. Clin. Soc. London*, 1901. 9. Harris, *Brit. Med. Journ.*, London, 1897, vol. i. 10. Thorburn, *Ibid.*, 1893, vol. i. p. 1159. 11. Möbius, *München. med. Wchnschr.*, 1892, Bd. xxxix. S. 399. 12. Farquhar Buzzard, *Brit. Med. Journ.*, London, 1901, vol. i. p. 1334. 13. Walters, *Ibid.*, 1896, vol. i. p. 329. 14. Hirschfeld, *Ztschr. f. klin. Med.*, Berlin, 1902, Bd. xliv. S. 251. 15. Thorburn and Westmacott, *Trans. Path. Soc. London*, 1896. 16. Thayer, *N. Y. Med. Journ.*, 1896, vol. lxiii. p. 33; *Phila. Med. Journ.*, 1898, vol. ii. p. 955. 17. Chatin et Cade, *Lyon méd.*, 1901, tome ii. p. 281. 18. Schittenhelm, *Berl. klin. Wchnschr.*, 1902, Bd. xxxix. S. 254. 19. Gilbert et Fournier, *Rev. mens. d. mal. de l'enf.*, Paris, 1895, p. 309. 20. Taylor,

Guy's Hosp. Rep., London, 1895, p. 45; 1897, p. 1. 21. ROLLESTON, "Encycl. Med.," vol. vi. p. 499. 22. TAYLOR, *Guy's Hosp. Rep.*, London, 1897, p. 13. 23. GILBERT ET LEREBOUILLET, *Gaz. hebd. de méd.*, Paris, 1902, p. 1. 24. BÉCLÈRE, *Bull. et mém. Soc. méd. d. hôp. de Paris*, 1901, tome xviii. p. 283. 25. FREYTAG, "Inaug. Diss.," Bonn, 1891. 26. WEST, *Trans. Clin. Soc. London*, 1897, vol. xxx. p. 60; "Diseases of the Organs of Respiration," vol. ii. p. 490. 27. GODLEE, Fowler and Godlee's "Diseases of the Lungs," p. 705. 28. MASSOLONGO, *Policlin.*, Roma, 1897, vol. iv. p. 512. 29. STERNBERG, Nothnagel's "Spec. Path. u. Therap.," Bd. vii. S. 72; *Wien. klin. Wchnschr.*, 1899, S. 237. 30. GILLET, *Ann. de la policlin. de Paris*, 1892, tome ii. p. 93. 31. MOIZARD, *Bull. et mém. Soc. méd. d. hôp. de Paris*, 1893, tome x. p. 359; *Progrès méd.*, Paris, 1893, tome i. p. 384. 32. MOUSSONS, *Journ. de méd. de Bordeaux*, 1890. 33. DEMONS ET BINAUD, *Arch. gén. de méd.*, Paris, 1894, tome ii. p. 129.

THE IMMORTAL MEMORY OF HARVEY.

By CHARLES E. UNDERHILL, M.B., F.R.C.P.Ed., *President of the Harveian Society.*

THE Harveian Festival was celebrated at the Royal College of Physicians on the 9th June 1905. There were present the President, Dr. Charles E. Underhill, Sir Halliday Croom, Professor A. R. Simpson, Dr. Clouston, Professor Chiene, Dr. Crawford Renton, Dr. Playfair, President, Royal College of Physicians; Dr. M'Bride, Dr. George A. Gibson, Dr. Dunsmure, and about fifty members of the Society. The immortal memory of Harvey was eloquently proposed by the President in the following terms:—

I now come to what is really the toast of the evening, namely, "The Immortal Memory of William Harvey." It is but to very few men that this honour is accorded. So far as I know, John Hunter is the only other man in our profession on whose name a Society has been founded, and such a toast is annually proposed; while at the annual dinners of the Edinburgh Obstetrical Society one of the toasts is always the Immortal Memory of Sir James Simpson.

Now it seems to me to be rather a solemn thing to stand here, and, looking backward over the centuries, to ask you to drink to this toast to one of our greatest professional heroes. Hero-worship, and this is hero-worship, is an ennobling pursuit so long as our hero is a worthy one; and who will venture to say that Harvey is not worthy? It lifts us out of the dull and dusty track of daily life, and raises us to a higher plane and a purer air. It makes us forget for a while the trials and the troubles, the sorrows and the sins, with which we have to contend day after day and hour after hour, as we fight the battle of professional life.

But, in my judgment, Harvey was not merely a professional hero, not only a hero of this society and similar ones, or even of this nation; I look upon him as a hero of universal science. He was not only a great doctor and a great observer, but he showed, above all other men, that the pursuit of knowledge for itself, the holding aloft and keeping alight of the lamp of science, is the truest and the best, if it be not the only way to benefit mankind.

It is impossible to estimate, and I make no effort to do so, the enormous advantages which have accrued to medical science and medical art, to the health of nations and the longevity of the race, from the discovery of the circulation of the blood; for it was the discovery that the blood circulates, moves perpetually round in a circle, with the heart as the centre and motive power, that was the apex and coping-stone of the scientific edifice which Harvey reared. That the blood had some sort of motion had been known for centuries, but quite erroneous and divergent notions were held as to the cause and nature of that motion. Some, for instance, thought that it was an undulating to and fro movement like the tide in the Euripus; others, that the heart was a cistern, to which the blood returned at night, while it spread over the body during the day. No man, before Harvey, ever dreamed that the heart was the engine, the motive force that drove the machinery. Even the poets have been called in to testify to this; thus Shakespeare makes Brutus say to Portia—

> "You are my true and honourable wife,
> As dear to me as are the ruddy drops
> Which visit my sad heart."

And Cowley, a contemporary and friend of Harvey, puts it thus in clearer but far less poetic fashion—

> "These circling streams, once thought but *pools* of blood
> (Whether life's fuel or the body's food),
> From dark oblivion Harvey's name shall save."

But the discovery of the circulation constituted but a part, and during his later years a comparatively small part, of Harvey's activities. Wherever he was, at home or abroad, in Scotland or on the Continent, at Oxford or at Edge Hill, he was for ever questioning, examining, investigating, dissecting, looking for new things or making clear the old. He was a true offspring of his age, an age when the spirit of man was bursting asunder the bonds and cerements of classicalism and tradition, and was pushing forwards with fierce energy upon new fields of conquest. Discovery was opening up new worlds, material and moral—material, in the shape of new islands and continents far across the seas, teeming with novel forms of animal and vegetable life, and of the mineral products of the soil; while, on the moral side, the great thinkers of the epoch were delving down deep into their souls, and bring-

ing up precious treasures, to be thereafter embalmed in deathless verse or noble prose; and Harvey had his full share of the consuming curiosity of his day, and expended his amazing energies in the investigation of all forms of animal life, from the least to the greatest. He was the first great comparative anatomist and biologist; and, being gifted with a fine poetic and scientific imagination, he saw clearly that, if he wished to gain a true knowledge of the form, the functions, and the uses of an organ in man, he must follow it up through the changes that it underwent in the lower forms of animal life; indeed, he himself tells us that he had never dissected any animal without discovering something new, or something that had been known before but had been forgotten; as the poet finely says—

> "Thus Harvey sought for Truth in Truth's own book,
> Creation, which by God Himself was writ."

But I dwelt at some length upon the scientific aspect of Harvey's life in my address this afternoon; let us now turn to the social side, and inquire, What manner of man he was among his fellow-men? What sort of personal record did he leave behind him? Now, most of our direct knowledge of this matter comes from a rather unsatisfactory source, namely, John Aubrey's *Lives.* Aubrey was a chronicler of the men of his day; he was an intimate acquaintance of Harvey's, and helped to carry his body to the grave. But he was, moreover, a confirmed gossip and purveyor of tittle-tattle; he was one of those men who prefer to take note of men's frailties rather than their virtues, of men's weaknesses rather than their strength—an earlier and much inferior Pepys. Thus he tells us that Harvey was a choleric and violent man, and yet when Harvey himself speaks of the destruction and sacking of his house by the parliamentary mob, there is no bitterness or acrimony in his words, only a deep expression of sorrow at the loss of so many valuable notes and specimens—an irreparable loss it was, for it included most of his records of his cases, and also the fruit of the work of many years on the generation of insects and frogs. Harvey was, it is true, a keen controversialist, but he never descended to ribaldry or abuse, such as was thrown upon him with unsparing hand by many of his correspondents and opponents. His weapons were far different —convincing logic and scientific debate. As he himself says, "To return evil speaking for evil speaking I hold to be unworthy of a philosopher and searcher after Truth."

Again, Aubrey tells us that he had a poor opinion of women, and would say that "we Europeans know not how to manage our women; the Turks are the only nation who use them wisely." And yet he was devotedly attached to his wife, and in his will he left numerous legacies to his sisters and their children, and to several poor widows to support them in their poverty. More-

over, says Aubrey, he had not much opinion of mankind in general, and he would say that "man was but a great mischievous baboon." And yet he had a soul attuned to friendship: it was an essential part of his nature; and he had troops of friends, from the king himself (Charles the First), between whom and Harvey there existed a bond of mutual respect and affection, through a long list of the leading men of the day, down to his own disciples Ent and Scarborough. And he never refused his help to any worker who approached him with an earnest mind. His family ties, too, were of the closest: he and his many brothers and sisters were bound together by the most cordial bands of affection. One of them, Eliab, looked after all Harvey's money matters,—for he cared nothing for wealth,—received him into his house, and cared for him during the later years of his life. In matters of religion Harvey was a man of deep convictions. Throughout his writings, particularly his later works, passages abound alluding to the immediate agency of the Almighty, the omnipotent ruler and maker of all things. "Nature does nothing wrong," was a favourite remark. Nature was for him a synonym of the Deity; he "looked through Nature up to Nature's God."

His will, which has been called by one of his biographers "a piece of beautiful humanity," opens with an unusually solemn exordium: "In the name of the Almighty and Eternal God, Amen. . . . I do most humbly render my soul to Him that gave it and to my Blessed Lord and Saviour, Jesus Christ." He lived at an epoch of great religious ferment, of warring creeds and petty distinctions, but, as became a philosopher and a naturalist, he took a calmer and wider view of the future than most of his contemporaries. In fact, "take him for all in all," he lived up to Plato's ideal, "Do what thou hast to do, and know thyself."

In conclusion, I would ask, What if Harvey could have seen—perhaps he has seen—the scientific triumphs and glories of the last century: the new circulation in the body politic which men call railways; the new nervous system which they call electricity; the new motive air they call steam; to say nothing of the wonders of Rays and Radium? How he would have rejoiced and gloried in the vision. And though the years that have rolled by since Harvey passed away must be reckoned by centuries and not by decades, we still seem to hear the voices ringing in our ears which tell of his unwearying industry, his marvellous powers of observation and of logic, his unswerving and absolute devotion to scientific truth. Let these be, for us, the lessons of his life; let these be the texts of our discourse, as year by year we meet at this board to drink, with all reverence, a solemn toast to his memory.

MISSED LABOUR AND MISSED ABORTION.[1]

By James Oliver, M.D., F.R.S. (Edin.), F.L.S.

Missed labour and missed abortion are subjects briefly referred to in text-books, and, judging from the very meagre way in which they are therein dealt with, one is apt to assume that both equally are extremely rare conditions. Now, regarding the former phenomenon, this inference is perfectly justifiable; and I would go further, even, and assert that it is very doubtful whether any true case of missed labour has ever been observed. Cases are on record, but a careful scrutiny of facts leads one to believe that these, in all probability, were cases of full-time ectopic pregnancy, in which the gestation sac, whether located primarily in the wall of the uterus itself, or having been throughout merely closely related to it, established eventually a communication with the uterine cavity; and as fœtal remnants were finally extruded by or removed from the uterus, the conclusion, not unnaturally perhaps, arrived at was that the fœtus all along had been lodged in this organ, and the case on this account was looked upon and described as one of missed labour. The labour undoubtedly had been missed, but it was impossible that it could be otherwise, for the ovum having failed to reach the uterus after fecundation, had developed and attained maturity in an abnormal situation in a location from which it could not naturally be expelled. Twenty years ago, cases of this character were occasionally seen, in which twelve or more months apparently after the death of the child, bones found their way externally by the bowel, uterus, and bladder; but in these enlightened days such untoward developments are not to be expected, since we ourselves are altogether more alert, and patients now seek advice for abdominal tumours more readily than was their wont. Of full-time ectopic pregnancy I have had a somewhat extended experience, as I have for this reason removed the fœtus by abdominal section on six occasions. In one of these cases, the patient, a multipara, had run this course of pregnancy without experiencing one symptom or noting one sign different to that of a normal pregnancy, and practically her sole complaint when she was sent to me by her medical attendant (Dr. Beaumont of East Ham), was that her anticipated and duly reckoned date of labour had been missed. Labour-like pains, it is alleged, are under such circumstances invariably experienced at or about the time when the birth of the fœtus should take place; but it is highly probable that this is a purely mythical notion, as in no case that I have seen were pains of this type ever experienced. It is noteworthy, however, that in

[1] Read before the Ilford Medical Society, June 1, 1905.

cases of this kind the menstrual discharge shows a disposition to re-appear about six weeks after the probable date of the death of the fœtus, at about the same time, that is, as we look for its re-appearance after a normal labour when no attempt is made to suckle the child. Although ectopic pregnancy, comparatively speaking, rarely proceeds to maturity, it is nevertheless a phenomenon of fairly frequent occurrence; but the diagnosis of this condition is not at all times easy, since the relationships of the gestation sac to the body of the uterus may be so intimate that it may be difficult to determine whether the ovum or the mature fœtus is lodged in or located outside the uterus. Hæmorrhage externally from the genitals is the most constant symptom of ectopic pregnancy; and as the appearance of this is commonly preceded by a more or less prolonged period (from five to ten weeks) of amenorrhœa, it frequently happens that the subjects of this disorder, being suspicious of the existence of pregnancy, seek advice because they fear abortion is threatening. Abortion may be threatening, or may actually have occurred, but it takes place internally instead of externally, and is therefore concealed; and if no very untoward symptom be manifested, the medical attendant as well as the patient may never be cognisant of what has transpired, and the abortion is in the fullest sense of the word missed. Full-time ectopic pregnancy constitutes probably the only form of missed labour that is or has been seen, and early extra-uterine death constitutes undoubtedly the most typical form of missed abortion possible, for in neither case can the product of conception be cast off by the mother as it ought. This, however, is not the missed abortion which is classically recognised, and which we presently shall discuss; but a brief reference to it here may be profitable as well as warrantable.

The fertilised ovum when arrested in its transit to the uterus is, as you are well aware, arrested generally in some portion of the Fallopian tube, and in this location its development and growth may proceed. This structure, however, is ill-adapted for harbouring and meeting the requirements of such an actively growing body as an oosperm, and the demand, inopportunely and hastily made upon the vessels in and about the tube, is apt to result sooner or later in an undue thinning of their walls, whereby spontaneous rupture almost invariably occurs, and the blood thus extravasated may terminate the existence of the embryo, and may directly even endanger the life of the mother.

Pain is, as a rule, the first symptom noted in association with the evolution of an ectopic gestation. The patient may or may not have missed one or more menstrual periods, and consequently may or may not have considered herself pregnant when, without any intimation that she was the victim of a serious disorder, she is suddenly seized with severe pain in the lower abdomen. This pain, although usually somewhat diffuse, may nevertheless be

referred more especially to one or other side of the pelvis, and in a few cases it is even referred to the region of the chest. Occasionally it is so intense, that, like other severe attacks of pain, it excites vomiting. If concomitantly with the pain there should be a rapid and excessive extravasation of blood into the peritoneal cavity with or without rupture of the Fallopian tube itself, there will then be manifested the usual signs of such an accident, namely, collapse. Apart, however, from any undue depletion into the peritoneal cavity, or into the substance of a broad ligament, a more or less profound feeling of faintness may be engendered through the agency of the pain alone. Sometimes little or no pain is experienced throughout the evolution of an ectopic pregnancy, even when the fœtus is matured in its abnormal situation; but when this symptom has once been evoked, it may continue to prove troublesome, and recurring exacerbations of it are apt to be experienced. It occasionally happens that the appearance of a hæmorrhagic discharge from the vagina is the first intimation to the patient that something unusual is occurring, but in the majority of cases this discharge makes its appearance coincidently with the first attack of pain, and these together tend to arouse in the patient a suspicion that she is threatened with abortion. Now, external hæmorrhage from the genitals is a very constant and somewhat persistent symptom of tubal pregnancy. It varies greatly in amount and appearance. It may be scanty or, comparatively speaking, free, and not uncommonly it presents the appearances of broken-down rather than of fresh blood. Without there having been any interruption of the menstrual periods, this discharge may make its appearance exactly at the time when the patient looked for the recurrence of her usual monthly flow, and under such circumstances it may attract little or no attention, until, as invariably happens, it shows practically no disposition to cease. In the majority of cases, however, it is preceded by a more or less prolonged period of amenorrhœa. In the former case, there is, of course, nothing to arouse the suspicion of the patient or the medical attendant as to the probable existence of pregnancy, but in the latter the pre-existing amenorrhœa is a strong incitement. During the evolution of ectopic gestation a decidual membrane is sometimes formed in the uterus, but this is a much less common association of the derangement than the majority of authors would have us believe, and as a positive sign it is hardly to be reckoned with. On the evidence of this objective sign alone, I have, however, known the diagnosis of etcopic pregnancy made and abdominal section performed, but, to his dismay, the operator, on exploring the abdominal cavity, could discover nothing abnormal. I would here remind you that in so-called membranous dysmenorrhœa, membranous casts more or less complete of the uterus may be shed; but I would add that membrane of this kind may even be extruded from the uterus about the mid-

menstrual period, and independently, therefore, of a recognised menstruation. The membrane produced in association with ectopic pregnancy is probably never formed before the embryo is six weeks old, but at any time thereafter it may be expelled from the uterus either as a complete cast or in a more or less fragmentary manner as mere shreds. The expulsion of this membrane may take place coincidently with the first attack of pain, but more usually it is expelled with more or less pain some time after this event, and after external haemorrhage has been in existence a greater or less length of time. The dislodgment of the membrane may or may not be accompanied with any evident increase in the amount of the already existing external haemorrhage. The subjects of ectopic gestation complain occasionally of pain during micturition, of difficulty in passing water, and even of retention of urine. The cause of these bladder symptoms is not, however, always intelligible, since the pain cannot invariably be attributed to the existence of adhesions, nor can the inability to pass water be ascribed to pressure, for I have observed retention of urine, due no doubt to some inhibitory influence, in cases in which the gestation sac was no bigger than a walnut. Rectal symptoms are not common.

On the physical signs of missed extra-uterine abortion I need not dwell, as it is the classical form of missed abortion, the missed uterine abortion, which concerns us more especially at the present time.

Missed (uterine) abortion, unlike missed (uterine) labour, is not an event of rare or doubtful occurrence. It is a distinct entity, and in the practice of any individual it may be encountered as often as ectopic pregnancy. It consists in the embryo perishing at an early stage of its existence, before the so-called period of quickening, and continuing thereafter its sojourn in the uterus for a more or less indefinite period of time. The title missed abortion is, however, somewhat of a misnomer, for although the abortion is missed in so far as this event does not so quickly succeed the death of the embryo as we naturally expect, yet the abortion will most assuredly take place, consequently the event is not missed but merely unduly delayed. During this period of delay the product of conception undergoes important changes,—changes consequent upon the cessation of vitality,—and it is noteworthy that the subject of this derangement is, as a rule, induced to seek advice more on account of the absence of signs than in consequence of the existence of any definite symptom. It is an accident which may occur at any time during the child-bearing epoch of the woman, in a woman who has already borne several children, as well as in one who has recently begun to live a marital life. In the former case, lactation is apparently accountable sometimes for the production of this anomalous phenomenon, for occasionally it is observed to result when

conception occurs, whilst the activity of the mammary glands is being maintained. When it happens in a woman soon after marriage, it evidently depends upon some supervascular condition of the endometrium, for in such we commonly elicit the fact that subsequent to marriage the menstrual discharge had not only been increased in quantity, but had recurred too frequently. It is sometimes induced through the agency of physical shock, a fall, and in yet another group of cases it is determined by an hyperatrophy of the chorionic villi, an atrophy which transcends the normal amount.

The symptoms or complaints associated with missed (uterine) abortion are, as I have already remarked, more those of a negative than a positive character. On account previously of a more or less prolonged period of amenorrhœa, and possibly of some sickness, the patient in the early days has usually and rightly considered herself pregnant, but misgivings regarding the existence of this state are eventually engendered when other ordinary manifestations of a progressing pregnancy fail to be revealed, to wit, changes in the breasts, enlargement of the abdomen, and the movements of the fœtus. When intra-uterine death occurs, and the intact product of conception is thereafter retained for any length of time, the fœtus withers and undergoes mummification or lardaceous change, according to its stage of development. With the cessation of active life the secretion of amniotic fluid becomes arrested, and what has already been poured out is gradually absorbed, and may even disappear altogether. Whilst these retrograde changes are proceeding, pain slight or somewhat severe may or may not be complained of, but more or less external hæmorrhage from the genitals is generally noted, and occasionally it is the occurrence of this alone, as in the case of ectopic pregnancy, which causes the patient to seek advice. The blood, which may be bright or dark in colour, may come away from time to time in little gushes, but more usually it is a more or less constant coffee-coloured discharge which worries the patient. The embryo, under the aforesaid circumstances, has always been dead some weeks or months before advice is sought, consequently we are not surprised to find, on examination, that he physical signs neither correspond with nor are characteristic of those of a normal gestation. It almost invariably happens that the embryo perishes whilst the uterus is still confined to the pelvis, or before it at least has extended far into the abdominal cavity, hence palpation of the abdomen fails, as a rule, to reveal the existence of any distinct swelling, and may practically elicit nothing more than a little tenderness in the hypogastrium. So, too, the breasts seldom display the appearances characteristic of pregnancy, and it but rarely happens that in non-lactation cases fluid is obtainable from them. In diagnosing this derangement, we must weigh carefully the physical signs detected by the bi-

manual or combined abdomino-vaginal examination, and correlate them with the clinical history given. These signs belong essentially to the body of the uterus itself, for the condition of the cervix is of no diagnostic worth. To define the body of the uterus clearly, is not, however, at all times an easy matter, important though it is, yet we seldom experience much difficulty in determining that there is not at all events that amount of enlargement which the clinical history predicted. The consistence of the uterus, and commonly its contour too, is very different to that of a normal gestation. The uterus, as a whole, is altogether more firm and less cystic than it should be, and on account of a somewhat inert and plastic condition of its substance generally, this organ may mould itself to and assume exactly the shape and display the outline of the body it contains, and this, in consequence of more or less contraction and retraction, is often very distinctly lobulated.

It is most remarkable that the uterus, contrary to its usual mode of behaviour, should tolerate for weeks or months, it may be, the presence of a dead ovum in its cavity, without endeavouring to make a more speedy and determined effort to rid itself of such an undesirable tenant, and it is noteworthy, too, that no evidence of constitutional disturbance in the mother results from the prolonged detention. The tolerance depends upon some anomalous condition of the uterine tissue, whereby its irritability may not only be impaired but annulled, and the peculiar shape which the uterus in any given case may exhibit is attributable to the same cause. The absence of constitutional disturbance in the mother, on the other hand, depends upon the fact that the ovum in cases of this kind invariably maintains its integrity until it is extruded, and it is enabled to preserve this integrity through the nutriment it absorbs from the endometrium.

The occurrence of this phenomenon is in the majority of cases preceded, no doubt, by some derangement of the uterine vessels, more especially of those ramifying in the subepithelial tissue, a derangement which impairs their functional vigour, and renders them, when called upon, to respond to the irritative influences emanating from an oosperm so unequal to the task, that they are prone to rupture spontaneously. As a result of this, blood is often extravasated into the decidua placentalis, or between this and the placental chorion, and the blood thus extravasated forms sometimes distinct tuberous projections on the fœtal surface of the embryonic sac. The condition of the blood vessels hastens the process of disorganisation, but in the first instance they are a result and not a cause of the actual disorder. Again, the utero-placental sinuses are sometimes blocked and rendered useless, and yet no breach in their continuity may have taken place.

Lactation, or rather super-lactation, sexual over-excitation, mitral regurgitation, and physical as well as mental shock, are

agents which tend to determine missed uterine abortion, and the vascular change just referred to is probably a factor aiding merely in its precipitation. The anomalous behaviour of the uterus is, however, an all-important feature, and this depends, no doubt, upon some obscure nerve influence which alters the physico-chemical state of the uterine tissue generally, impairing or annulling thereby its irritability and rendering it somewhat plastic. In yet a few rare cases, hyper-atrophy of the chorionic villi is accountable for early intra-uterine death, but I am unable to say whether this results primarily from an embryonic or a maternal delinquency. The placental chorion and the serotina are very interdependent: they act and react so harmoniously upon each other, that any failure of response on the part of one is bound to exert a prejudicial influence upon the well-being of the other. During the first six weeks of its existence, the oosperm, wherever it may be harboured, is universally placental, that is to say, it derives its nourishment by absorption through the medium of its entire chorionic surface. Toward the end of the sixth week of embryonic life, this universal placenta undergoes transformation, and there is evolved from it a discoid structure which is destined to become the true placenta. Of the conditions which determine the placental site we are still ignorant, but we know that the villi over an area corresponding to about one-fifth of the total chorionic surface enter into the formation of the discoid placenta, whilst the villi over the remaining four-fifths undergo a retrograde change, and, gradually declining, finally disappear. This atrophic process may not confine itself to the proscribed area, but involve the placental as well, and if it invades this extensively the embryo will more or less rapidly perish. In superinvolution of the uterus after parturition we witness a very parallel phenomenon. In this case the dissolutionary changes consequent upon parturition appear to run rampant, and, transcending the usual amount, they induce such an amount of atrophy that the utility of the organ is for ever afterwards destroyed.

During the course of a twin pregnancy, one embryo may perish, whilst the other proceeds uninterruptedly with its development, and together they invariably continue their journey in the uterus until the latter arrives at maturity, and labour then setting in determines their separation. Missed abortion under such circumstances is not a matter of much importance, since it reveals itself only at the time of parturition, and may even then escape notice, for the gradually increasing pressure exerted by the growing fœtus in utero may practically annihilate it. This the so-called fœtus papyraceus is in reality only a curio.

Briefly, now, let me add a few words with regard to treatment in cases of missed uterine abortion. The temptation, no doubt, is strong to immediately empty the uterus, and if the question of treatment resolved itself merely into one of getting rid of the

contents of this organ, that would be the correct procedure. The important part played by the uterus should not, at least in the first instance, be altogether ignored, for it is its inertia which allows of the ovum resting more or less placidly in the uterine cavity. It is incumbent upon us, therefore, to endeavour to reanimate the uterine tissue, and restore it as far as possible to its pristine state, for when this is effected the expulsion *en masse* of the dead product of conception may soon thereafter be expected, a result which we by direct surgical interference cannot emulate. In the treatment of such cases the potassium and calcium ions are of great service, as they enter into combination with the uterine tissue and tend to reinvigorate it, and the salts of these metals which I am disposed to place most reliance upon are chlorate of potash on the one hand, and chloride of calcium on the other. In combination with chlorate of potash, it is well to administer tincture of nux vomica and possibly liquor arsenicalis, and with chloride of calcium either liquor strychninæ or liquor arsenici hydrochloricus. If, in spite of the administration of these remedies, the uterus should still appear to remain obdurate and irresponsive, it may at any time, then, be considered advisable to dilate the cervix and remove the dead ovum piecemeal.

REVIEWS OF
BRITISH AND FOREIGN LITERATURE.

Paralysis and Other Diseases of the Nervous System in Childhood and Early Life. By JAMES TAYLOR, M.A., M.D., F.R.C.P. London: J. & A. Churchill.

As there is not at present any entirely satisfactory text-book on the Nervous Diseases of Children, the attempt to produce one is more than justifiable, and its successful accomplishment would place the author *hors concours* so far as this field of medicine is concerned. The existing manuals, one and all, have the defect of being written almost exclusively from the neurologist's standpoint, and, excellent as they are so far as they go, many of the manifestations of nervous disease in early life are passed by, apparently not falling within the ken of those whose training is strictly neurological. We therefore looked forward expectantly to Dr. Taylor's new book, and it was with regret that, having read it, we were unable to write these opening sentences in the past tense, for the author gives us little but what may be found in any standard text-book, excellent though his presentment of his facts may be. It would, however, be unfair to allow the fact that Dr. Taylor's book is not what, in our opinion, a treatise on the nervous disease of children ought to be, to prejudice our criticism of details, and we therefore take up some points which struck us in reading his pages.

Under lumbar puncture no mention is made of cyto-diagnosis in the differentiation of the various forms of meningitis; otherwise the description of these diseases is good, and a useful table of the distinctive features of the tuberculous and posterior basic forms is given. In the suggestive chapter on the pathology of cerebral paralyses, stress is laid on the inflammatory nature of hemiplegia, and on cellular degeneration in diplegia. In this section the author does not, we think, attach sufficient importance to the birth trauma in producing cerebral palsy, though he discusses it more fully in treating of diplegia. From a practical point of view the effects of tedious labour on the child's brain cannot be too strongly insisted upon, as there is a deplorable tendency tacitly to ignore the fact that prolonged labour, and in particular the occurrence of asphyxia, is a much more fertile cause of cerebral lesion than the prompt application of forceps. Tumour, cerebral abscess, and hydrocephalus are well and fully described; for the last, drainage of the ventricles into the subarachnoid space is commended. Large doses of arsenic in chorea are condemned as likely to set up peripheral neuritis. It seems unnecessary to describe Dubini's disease, Huntington's chorea, and paramyoclonus along with chorea in a manual such as this. To say that the earliest manifestations of stammering do not

appear until after fluent speech has been acquired, is scarcely accurate: while this is its ordinary period of onset, it is not at all unusual to find temporary stammering very much earlier, and such a detail as this one expects to find noted in a work professedly dealing with children. Eclampsia is discussed on the ordinary lines: that curious group of cases in which convulsions occur with great frequency in quite young infants is not specially mentioned. In the chapter on Mongolism the reader is left with the impression that syphilis plays a part in its etiology—a view not held by authorities nowadays. The short account given of congenital defect of the ocular muscles might have been amplified, and the fact mentioned that other cranial nuclei may be similarly affected. It is hardly accurate to say that no searching examination has been made into the condition of the nervous system: we remember an elaborate paper by Heubner of a few years back, and there have been others since.

We are sorry to have been unable to review Dr. Taylor's book more favourably; the above criticism of details is but a small matter, and we have read great parts of the work with both pleasure and profit. But, to repeat our main objection, we do not find the nervous diseases which are peculiar to childhood, and hence escape notice in ordinary text-books, adequately treated. Thus spasmus nutans is omitted altogether; so are all such neuroses as pica, head-banging, so-called masturbation, thumb-sucking, and so on. Batten's type of cerebellar ataxia is unnoticed, and there is no separate account of hysteria—a disease which has very special manifestations in young children. Neither Hoffman's type of spinal muscular atrophy nor myatonia congenita is described, and there is no allusion to Hochsinger's work on myotonia. Again, in a book on the nervous diseases of children we should expect a chapter on methods of examination, and some account of the functional development of the nervous system—*e.g.*, the transformation of the automatic movements of the newly born child into the synergic movements of a later period—and of the reflexes in children; while a much fuller description of the various forms of mental defect, which is highly important to all practitioners who have to deal with children, might well have been included.

Clinical Hæmatology. By JOHN C. DA COSTA, jun., M.D. Second Edition. London: Rebman Limited.

THE second edition of Da Costa's well-known manual of hæmatology may be confidently recommended as a complete and thoroughly reliable guide to the subject. The opening section of the book deals with methods of examination—cytological, bacteriological, chemical, and physical; the selection of these is judicious, and the description given so detailed as to be an ample practical guide to the worker. In Section 2, which treats of the blood as a whole, a paragraph is devoted to pseudo-anæmia—that appearance of pallor, unassociated with any alteration in the composition of the blood, which occurs under a variety of circumstances. In the discussion of the curious hyperglobulia of high altitudes Dr. Da Costa expresses the view that it is due to concentration of the blood, not to compensatory production of large numbers

of corpuscles. The account of diseases of the blood has been thoroughly revised to date; the author is a sceptic as regards the conversion of pernicious anæmia into leukæmia, and believes that most of the alleged cases belong to the group of leucanæmia (Leube). A good description of leukæmia is given, but more space might have been devoted to the question of intermediate forms, as well as to acute myelocytic leukæmia, both of which are dismissed in a line or two. Leucanæmia, too, might have received more attention.

In the chapter on "Anæmias of Children," Pollmann's oft-quoted case of myelogenous leukæmia in a newly born infant is mentioned; there is, however, little doubt that this was merely an example of lymphatic leukæmia, and the fact remains that at this age myelogenous leukæmia is practically unknown. Da Costa denies to von Jaksch anæmia the right of existence as a separate entity, a position which is not tenable if the whole clinical picture is taken into account. The last 200 pages are devoted to general hæmatology, and it is here that the chief advances have been made since the last edition of the work was written. Chloroma is placed in this section, and the blood changes are given according to the most recent work. We think, however, that the disease falls more naturally to be considered along with leukæmia than apart from it. Cyanotic polycythæmia is fully dealt with, and a good deal of space is naturally allotted to the examination of the blood in typhoid fever. Trypanosomias, too, comes in for adequate notice. It is, however, impossible to go on particularising, and we are compelled by space to conclude this review in a word, by saying that, great as has been Dr. Da Costa's industry in revising and bringing his manual up to date, he has his reward in the production of one of the best text-books of hæmatology at present in existence.

Diseases of the Blood. By Professor Dr. P. Ehrlich, Professor K. von Noorden, Dr. A. Lazarus, Berlin, and Dr. F. Pinkus. Edited, with additions, by Alfred Stengel, M.D. Philadelphia and London: W. B. Saunders & Co.

We welcome this translation of a book which, in the German original, has been a standard work for several years. At the same time one has the feeling that it is just a little belated. The book embodies much of the original work of some of the greatest pioneers in the field of hæmatology, but some years have elapsed since it was first written, and it is difficult at the present day to write even a magazine article which will be abreast of the times in almost any department of hæmatology. The first part of the work, dealing with the normal and pathological histology of the blood, has previously been translated into English by Walter Myers. The editor of the present volume has had no easy task. Some of the views which Ehrlich and his school have rather dogmatically asserted are now strongly controverted, and some notice of opposing views has become essential. The large amount of recent work on hæmatology has also made additions imperative. These additions have been made most judiciously, and do not in any way interfere with the sequence or characters of the original. The book is divided into four sections. The first deals with the histology of the

blood in health and disease, the second with the forms of anæmia other than chlorosis, the third with chlorosis, and the fourth with leucocythæmia. The work differs from text-books on clinical hæmatology in presupposing some knowledge of the details of technique, and in discussing diseases of the blood only and omitting an account of the blood in individual diseases, except in as far as the latter is incidentally mentioned in connection with the chapters on leucocytosis, leucopenia, etc. Needless to say, the subjects taken up are very fully dealt with. Von Noorden's article on chlorosis extends to nearly 200 pages. All the theories, old and more recent, regarding its etiology are examined, and the effects of iron, arsenic, diet, mental work, corsets, constipation, baths, sentiment, and matrimony are among the subjects considered in relation to its treatment. Von Noorden looks upon iron treatment as a means of stimulating hæmatogenesis rather than as a means of supplying a deficient material. Repetition of this stimulus leads to toleration, and therefore the prophylactic administration of iron is condemned. One looks in vain for some guidance in the diagnosis of that puzzling condition, Hodgkin's disease. Pinkus lays down some definite requirements as regards the blood changes, but these are controverted in an editorial parenthesis. Important additions to the original are the chapters on chloroma and on the X-ray treatment of leukæmia. The literature of the latter already begins to be formidable, but apparently the claim for its utility is not yet a very strong one. The volume is well got up, and is a work of great historic interest as well as intrinsic value. Some of the illustrations are poor, but the coloured plates are admirable. Among other printer's errors, we noticed "two" spelt "too" on Plate XI., and on page 616 an aberrant heading in bold capitals has invaded a paragraph on the treatment of leukæmia.

The Blood: How to Examine and Diagnose its Diseases. By ALFRED C. COLES, M.D., D.Sc., F.R.S.E. Third Edition. London: J. & A. Churchill. 1905.

THE monograph on the blood by Dr. Coles is so well known as one of the best treatises on hæmatology, that little need be said of the recently published third edition of the work.

The author has added sections dealing mainly with chloroma, trypanosomiasis, the Leishman-Donovan bodies, *Pyrosoma bigeminum*, and the hæmosporidia of birds. To those subjects, all of great interest, full justice is done by the author in some fifty-four pages, whilst a new plate gives an excellent illustration of trypanosomes, *Proteosoma*, *Halteridium*, and other blood parasites.

Except for those additions, there is little change from the text of the second edition. The author still expresses his preference for eosin-hæmatoxylin as the most constant and reliable stain for blood films. Of recorded cases of acute leukæmia, we are still told that at the present time their number has reached to thirty-five or forty. And Widal's serum test for typhoid fever is still spoken of as if it were a method quite recently introduced.

Yet these are points of minor significance, and the work remains

what it was, namely, one of the best books on a subject of great importance to the student and practitioner of medicine.

The Practical Study of Malaria and other Blood Parasites. By STEPHENS and CHRISTOPHERS. Second Edition. London: Williams & Norgate.

THE first edition of this work, published little more than a year ago, supplied a distinct want, and was much appreciated by those engaged in the study of malaria and allied diseases. That its value was fully recognised, is further shown by the frequent references to it in current literature, and the free manner in which some of the illustrations have been reproduced both at home and abroad.

The present edition is much more elaborate than the former one, four new coloured plates having been added, and the whole work well written up to date.

The various methods are clearly and lucidly described—the chapters on "The Examination of the Mosquito" being especially good.

The book is evidently the work of practical men, and should be in the hands of all engaged in the study of tropical diseases, especially of those who wish to go thoroughly into the subject. It is, however, to be regretted that its value both as a guide to the worker and (as claimed by the authors) "a convenient and complete book of reference," is much diminished by the evidences of haste both in the compilation of the book and the revision of the proofs. This defect is doubtless due to the exigencies of work in India.

The coloured plates are excellent, but as the work is primarily on malaria, two out of six plates is a small proportion to devote to this disease. The Trypanosomata are lavishly illustrated (the *T. Dimorphum* being represented five times), while *Proteosoma* and *Halteridium*, which are, in the light of recent work, of great importance, do not find a place.

The uncoloured illustrations are, on the whole, fairly good, but those in the first four chapters, *e.g.*, on malaria and normal blood, are unworthy of the book. They are sketchy in the extreme, and are confusing, if not actually misleading. Figs. 2 to 4 are most unsatisfactory —in the last the representation of a "Crescent" tertian is hardly likely to be of help to the beginner, or used for reference by those of greater experience.

Much space is devoted to a description of Schaudinn's work on the relation of Trypanosomes to Halteridia. This work has not been fully corroborated; in fact, the elaborate researches of Novy and MacNeal apparently prove that Schaudinn's conclusions are incorrect. On the other hand, Rogers' method for the cultivation of flagellates from Leishman-Donovan bodies—recently successfully followed by Leishman and others—is passed over in a few curt sentences.

As practical men, the authors should have pointed out that puncture of the spleen with a hypodermic needle for diagnostic purposes is not unattended with risk, and that, as shown by Donovan, certain precautions are necessary.

The statement that the climatic conditions in the Dooars and in the

environs of Calcutta are "practically identical" (p. 256) is surprising to those with personal knowledge of both districts. The former is at the foot of the Himalayas, 300 to 400 feet above sea level, with clear running streams; the latter, practically at sea level, with innumerable fœtid jheels.

In spite of its few defects, which we hope to see remedied in a future edition, we can thoroughly recommend the book to those who wish to take part in the investigation of tropical diseases.

The Development and Anatomy of the Prostate Gland. By W. G. Richardson, M.B., B.S., F.R.C.S., Newcastle-on-Tyne. London: J. & A. Churchill.

It is not often that a prize essay competition elicits work of such sterling worth as Mr. W. G. Richardson's thesis on the prostate gland, which was awarded the Heath Scholarship of the University of Durham in 1904. Although the prescribed subject was the injuries and diseases of the prostate and their surgical treatment, Mr. Richardson has, wisely we think, confined his attention almost entirely to those points which have a bearing on chronic enlargement of the gland, with the result that we have in the volume before us a most complete and well-thought out study of the various aspects of this much-debated subject. In the first section the author furnishes us with a detailed description of the anatomy of the normal gland, and of its relations to surrounding structures, based on a number of dissections made by him, and illustrated by a series of beautiful drawings from his own pencil. The capsule of the prostate he describes as "a firm envelope, which is everywhere intimately connected to the stroma of the organ on its inner surface . . ." Outside this is the "fascial sheath," in which the plexus of veins is embedded; and "the recto-vesical fascia," which "is bound to the sheath laterally, but is a separate structure which belongs to the pelvic wall, and not to the genito-urinary tract."

The next section is devoted to a study of the comparative anatomy of the prostate, as illustrated by dissections of several varieties of the opossum, the squirrel, guinea-pig, rabbit, hedgehog, mole, dog, cat, and the ape. At the Oxford Meeting of the British Medical Association, we had the pleasure of examining Mr. Richardson's beautiful dissections of these various animals, and can testify to the faithfulness of the illustrations which accompany the descriptions here given. This section of the work in itself stamps Mr. Richardson's contribution to the literature of the subject one of outstanding originality and scientific value. After a description of the development of the prostate, the author enters upon an exhaustive discussion of the various clinical aspects of chronic enlargement or hypertrophy, into which considerations of space alone prevent us following him. We cannot, however, avoid making special mention of the series of forty-six drawings included in the work, which prove that the author is no less deft with his pencil than with his scalpel.

A Text-Book of Physiological Chemistry. By CHARLES S. SIMON, M.D. Second Edition. London: J. & A. Churchill.

ALTHOUGH but three years have elapsed since the appearance of the first edition of Simon's text-book, the advance of chemical research in the domain of animal life has been so great as to necessitate complete revision of the whole, and the re-writing of the chapters on the albumins, nitrogenous katabolism, and gastric and tryptic digestion. As it now stands, the book may be regarded as being thoroughly abreast of the times—a frontier-post marking the boundary of the achievements of the physiological chemist. Designed for students as a lecture-room and laboratory companion, the text is free from references to literature. There are, of course, two sides to the question. Personally, we think that in works of this description it is always advisable to give the titles of at least the most important papers. References become burdensome largely from lack of selection and a craving to make complete bibliographies. Now, what is desirable is to put the student on the easiest track of finding out all that has been done on any particular subject, and for this purpose, titles of well-chosen recent papers, themselves containing lists of references, are invaluable. This, however, is an open question, and with numerous excellent *Jahresberichte* and *Centrallblätter*, the difficulty now is not so much to find references as to find time to read them. The arrangement of the book into three parts, dealing with the foodstuffs, the processes of digestion and absorption, and the chemistry of the tissues, is logical and satisfactory, and every chapter shows evidence of the careful revision of an expert hand. For the benefit of the general reader, we would suggest that in future editions more space might be devoted to consideration of glands such as the adrenal and thyroid, whose active principles are so important in practical medicine. Dr. Simon has to be heartily congratulated on his clear exposition, and on the way in which he marshals the facts with which every page teems. A series of excellent laboratory exercises are given in an appendix.

An Introduction to Physiology. By L. A. HODGKINSON LACK, M.B., Ch.B. Edinburgh and London: William Green & Sons.

THE author in his preface states that this book is not intended to replace the standard text-books, nor to encourage cramming. It is to be feared, however, that although it may not do the former, it is rather apt to do the latter. It appears to be a moderately well arranged and amplified syllabus of what might be a course of lectures on physiology, and of course from its brevity it suffers in many respects. It is scarcely necessary to refer to the arrangement of the subject-matter, as it follows more or less that adopted either in a course of lectures or in an elementary text-book. It is unfortunate that it was not subjected to a more careful revision, as certain errata are present which could easily have been corrected. A certain degree of dogmatism is bound to be apparent in such a book, but in many cases this occurs to a greater extent than is excusable, as, for example, in the cursory treatment of colour vision, hearing, and also of many other sections. It has not been brought

well up to date, an error which could easily have been removed by consultation of any standard text-book. A few examples of errata, or omissions of treatment, may simply be enumerated. The descriptions of the tubules in the sarcous substance of the sarcostyles, the efferent nerve paths to the salivary glands, the coagulation of milk by rennin, the action of the succus entericus, the nature of pancreation secretion, the calculation of the amount of urea by the hypobromite method, the ammonium molybdate test for phosphates, the position of the retinal vessels, etc., are faulty. The book presents no features, in our opinion, which would warrant one recommending it for students' use.

Errors of Refraction. By CHARLES BLAIR, M.D., F.R.C.S. Bristol: John Wright & Co. 1905.

THIS little book, consisting of 103 pages, is compiled "to supply in a condensed form the more practical and clinical points in connection with Errors of Refraction," and is intended as "a clinical pocket-book for practitioners and students." So far as it goes it may be said to fulfil the purpose for which it was written, but, considering the special attention now given to this important branch of ophthalmology in the medical curriculum, a small manual such as this does not cover the ground, and we are therefore at a loss to know what special need there is for such a book, especially as there are several excellent students' manuals already available.

The definition given of hypermetropia and of myopia at pages 37 and 43 respectively are misleading, no reference being made to accommodation. In describing retinoscopy, we are surprised to find the concave mirror alone described, although its usefulness is inferior almost in every way to the plane mirror. Why continue to recommend the interpupillary distance as the guide for the estimation of the optical centres of the spectacle lenses, seeing that the visual axis in ametropia does not traverse the centre of the pupil? The corneal reflex is a much simpler and more accurate test for this purpose. At page 93 we find a specimen copy of a prescription for spectacles. Why give the "pupillary distance" and some other measurements in inches, while the strength of the lenses and the size of the spectacle-rims are given in decimals?

Rontgenologisches Hilfsbuch. On the Use of the Röntgen Rays. By FRIEDRICH DESSAUER. Bd. I. Wurzburg: A Stuber's Verlag.

THE author is an electrical engineer, who has devoted great attention to the application of the Rontgen ray apparatus to medical purposes. He is the inventor of a form of apparatus which is extensively employed in Germany. The volume now presented consists of a collection of essays and articles which have appeared within the past two or three years in various periodicals. They deal with all the more important practical points which are likely to arise. Thus the first article treats of the physical nature and character of the rays and of the construction, etc.,

of the tubes. In the second chapter the principal forms of tubes are discussed, along with the choice and use of tubes. Then there is an interesting chapter dealing with the methods of improving the definition of the skiagram by the use of diaphragms of various forms, intended to cut off the secondary rays. Other titles are—"The Source of the Current," "The Length of the Spark of the Induction Coil," "Interruptors." Lastly, there is an appendix on "Radio-activity."

Operationen am Ohr; Die Operationen bei Mittelohreitungen und ihren intrakraniellen Complicationen. Für Aertze und Studirende. Von Dr. B. Heine, Assistenten der Kgl. Universitätsohrenklinik. Berlin: Verlag von S. Karger.

The great improvements which have taken place during the last decade in the operative treatment of the suppurative affections of the middle ear and its complications, fully justify the publication of a monograph devoted to that branch of surgery. The importance of middle ear disease, not only in its relation to the function of hearing, but also to the life of the individual, must of necessity demand both from the aural surgeon and from every practitioner careful attention. To one conversant with the German language, the volume under review will supply abundant information, and the writer has made excellent use of the material placed at his disposal by Professor Lucae of Berlin. The subject is treated in an eminently practical manner. The indications for opening the labyrinth are discussed, and the method of operating is dealt with, while the diagnosis and treatment of intracranial operations come under notice. The author does not confine himself to his own views, but refers to and quotes the writings of others, thus adding to the value of his book.

RECENT ADVANCES IN MEDICAL SCIENCE.

MEDICINE.

UNDER THE CHARGE OF

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Epidemic Cerebro-spinal Meningitis.

The prevalence of epidemic cerebro-spinal meningitis on the continent of Europe and in the United States has naturally led to the appearance of a great many papers on the subject, and as there is always a possibility that this country may be visited as these have been, some abstracts of recent articles may not be without interest. The disease appeared in New York in February 1904. Its first intensity diminished with the advent of summer, but in winter a recrudescence occurred, and from 1st January to 15th April of this year there were 910 deaths. The disease has also appeared in Boston, in Ohio, and in Pennsylvania. In Silesia, from December 1904 to March 1905, there were 1088 cases, with 582 deaths. In the American epidemic, Councilman has shown that when the cerebro-spinal fluid contains other organisms (*e.g.* the pneumo- or streptococcus) in addition to the meningococcus, the disease is almost always fatal. All the American observers agree on the great diagnostic value of Kernig's sign. A new method of treatment—the injection of antidiphtheritic serum—is under trial, the idea being that there is an antagonism between the Klebs-Löffler bacillus and Weichselbaum's diplococcus meningitidis.—Jarvis, *Presse méd.*, Paris, 1905, May 6.

Kirchner (*Berl. klin. Wchnschr.*, 1905, June 5 and 12), dealing with the best means of combating the epidemic, states that in one Silesian province within three months the death-rate has been seven times as great as during the whole triennial period preceding. The epidemic is believed to have originated in Galicia, and the Silesian provinces infected are industrial localities,—by far the most densely populated area of the German Empire. The infected zone lies east of the river Oder; the river limits intercourse between dwellers on the opposite banks, and the fact that the disease has not crossed it shows the importance of direct contact as a means of transmission. The whole circumstances and distribution of the outbreak can be explained only

on the supposition that the disease spreads solely by personal communication. As to the age distribution, nearly one-half of over 2000 consecutive cases occurred in children under six, and another third between the sixth and tenth years. Statistics show, however, that contagiousness is comparatively slight, and the question has been raised as to whether there may not be some intermediate channel of infection [the flea has been suggested in America] analogous to the part played by rats in the transmission of plague. Epidemics begin gradually with a few isolated cases, and sudden generalised outbursts are unknown. In family epidemics the rule is to find that several cases occur simultaneously, so that the question of infection from one to another does not arise; the infrequency of serial cases in one house is against there being any intermediate host. It is often noticed that the return of a labourer from an infected district to his home at a distance is followed in three or four days by a case of meningitis there. The present epidemic has allowed of the investigation on a large scale of the relationship of the micrococcus meningitidis of Weichselbaum to the disease. It has been found in the cerebro-spinal fluid of 138 out of 243 patients, post-mortem in 68 out of 139 bodies, while the blood gives a positive agglutination in 55 per cent. of cases. The nasal secretion of 635 patients contained the organism in 23 per cent., while it was found in only 9 per cent. of healthy persons. One reason why it cannot always be detected in the cerebro-spinal fluid is its extreme vulnerability; the majority of positive results are got in the first few days of the illness. It is extremely sensitive to the action of disinfectants, being rapidly destroyed by 1 to 800 carbolic acid. In addition to the general application of sanitary restrictions, Kirchner believes that much can be done to save life by energetic treatment. Hot baths he especially recommends, and cautiously repeated lumbar puncture, withdrawing only a few cubic centimetres at a time. Risk of contagion is lessened by disinfecting the throats and nostrils of the parents.

Westenhoeffer (*Berl. klin. Wchnschr.*, 1905, June 12) treats of the *pathological anatomy and mode of infection*, on the basis of investigations made on twenty-nine bodies of patients dying during the present epidemic. His observations had as their object to determine—(1) the point of entrance of the germ, (2) the channel by which it reaches the meninges, (3) the lesion it produces. He invariably found lesions of the naso-pharynx, which, with the middle ear, antrum, and sphenoidal sinuses, was filled with muco-pus. The pharyngeal tonsil and mucous membrane generally were swollen and inflamed, but the anterior part of the nose was not affected. These changes were most marked in quite recent cases. The earliest signs of meningitis develop near the sella turcica, the infection probably entering along the vessels which pass into it from the post-nasal space. Developmentally the hypophysis is a sense organ which communicates directly during fœtal life with the naso-pharynx; thus extension of the infection to the sella turcica is analogous to its spread to the other accessory sinuses of the nose—the antra, sphenoidal air cells, etc. The author emphatically contradicts the statement that infection spreads from the ethmoidal cells. These he always found healthy, the reason being that they communicate with the anterior nares, which, as stated above, are spared. The constancy

with which squinting is a first symptom points clinically to the early implication of the sella. The Sylvian fissures are little affected, and the spread of the meningitis proceeds by the lymphatics, not by the vessels. Another fresh observation is that most children dying of the disease show evidences of "lymphatism"—enlargement of the pharyngeal tonsil, thymus, and lymphatic structures generally. Westenhoeffer speaks somewhat guardedly as to the cause of the disease. The meningococcus of Weichselbaum was found in most of his cases, but he does not regard the relationship as proved. Either other cocci must be capable of producing exactly similar results, or the cause is as yet unknown, and the organisms which have been found are secondary, like the streptococci of scarlet fever. The individual proclivity to the disease is undoubtedly most variable; the children who are most likely to be infected are those who suffer from enlarged tonsils and adenoids. On account of the dry, dusty, sulphureous atmosphere of the infected region, nasal and pharyngeal catarrh is common, and this may perhaps have some connection with the prevailing malady.

Symptomatology.—Foster contributes a study of thirty cases in the New York epidemic (*Am. Jour. Med. Sc.*, Phila., 1905, June), in which he draws attention to the spread of the disease among families as proving its contagiousness. The epidemic occurred during the early part of 1904, and coincided in point of time with an outbreak of extremely severe pneumonia. No disease shows greater lack of regularity in its mode of onset than cerebro-spinal meningitis. In most cases there is no period of incubation during which malaise is present; the invasion is extremely sudden in many of those attacked; splitting headache, delirium, and convulsions are commonly the first symptoms, and in children vomiting and gastro-intestinal disorder, with less violent headache. Pain may be limited to the head, or extend to the trunk and limbs. Head retraction, opisthotonos, and spinal hyperæsthesia are almost constant; sometimes there is nothing except slight head retraction, which inconveniences the patient scarcely at all, and is only recognisable as an evidence of the disease after lumbar puncture has been performed. It is impossible to found any classification of the cases on the type of the fever. The very worst cases may run an almost afebrile course; the most favourable generally range between 101° and 104°. A normal temperature unaccompanied by amelioration of the symptoms generally foreshadows a protracted illness. As in typhoid, the pulse is relatively slow. Rashes were comparatively infrequent in Foster's cases—purpura in six, herpes in five, and pustules in one. The blood was systematically examined, and, except for a polynuclear leucocytosis (average, 18,000 in adults, 20,000 in children) no important changes were found. A Gram-negative diplococcus, identical with the meningococcus, and pathogenic to white mice, was isolated from the cerebro-spinal fluid of all cases; no prognostic data, however, were obtained by lumbar puncture. As to special nervous symptoms, the eye is the organ most commonly involved, strabismus, nystagmus, exophthalmos, and visual defects having been noticed. Optic neuritis occurred twice only. The reflexes may be exaggerated at first; later they are almost always abolished. Kernig's sign is common in adults, less so in children. Heart complications occurred in five cases; pericarditis

seems particularly liable to escape detection during life, notwithstanding careful examination of the chest. In the cardiac lesions the meningococcus of Weichselbaum was present. Lobar pneumonia was twice, and arthritis thrice, met with. The infection often invaded the eye, producing destructive changes on the globe. In adults the diagnosis was easy; in children the disease may be simulated by gastro-enteritis and broncho-pneumonia; lumbar puncture, however, furnishes a crucial test. Foster's mortality was 60 per cent. In addition to the usual symptomatic remedies, he recommends lumbar puncture, repeated at intervals of three or four days; it relieves headache and delirium, and brings the semi-comatose patient back to consciousness. He is not enthusiastic on the value of intraspinal antiseptic injections, but tentatively encourages laminectomy and drainage. The clinical manifestations of the disease are also treated of by Haber (*Med. News*, Phila., 1905, May 27), who divides cases into malignant, ordinary, and anomalous forms. Fulminant cases show profound toxæmia; there is generally a profuse purpuric rash and hyperpyrexia, and death takes place within forty-eight hours. Relapses are common in abortive cases. Intermission of symptoms is very often seen. When the course is chronic, extending over a month or more, either abscess or hydrocephalus is likely to occur. General convulsions occur at the outset; later we have squinting, mono- or hemiplegia, rhythmical tremor, affection of sphincters, and local convulsions. Head retraction and Kernig's sign are very frequent. The temperature, pulse, and respiration are so variable as to be of no diagnostic or prognostic aid. In addition to the ordinary symptomatic remedies, the author advises baths at a temperature of 104°, an ice-bag being applied to the head at the same time. These should be repeated several times daily.

Bacteriology.—In a recent paper, Pinto (*Journ. de physiol. et de path. gén.*, Paris, 1904, November 14) insists on the *similarity between the meningococcus and the gonococcus.* Morphologically they are identical, even to the point of being found within the bodies of cells; tinctorially they are the same, the conditions under which they can be cultivated are similar, though the vitality of the gonococcus in the urethra contrasts with the short duration of life of the meningococcus in the nervous system. Toxins with almost identical properties have been isolated from both organisms. Attempts to inoculate pure cultures of the meningococcus into the urethra have, however, failed. Weichselbaum (*Wien. klin. Wchnschr.*, 1905, November 24) regards the presence of the *micrococcus meningitidis in the nasal secretion* as proved, and therefore looks on contagion as occurring directly by the air. The conflicting views of epidemiologists and clinicians on this point are due to the feebleness of the virus, which can only be communicated, and, when communicated, spread to the meninges, under favourable circumstances. Disinfection of the nose and throat, however, is clearly an important prophylactic.

The chief point in a paper by Grawitz (*Berl. klin. Wchnschr.*, 1905, June 17) is that the reasons for cerebro-spinal meningitis assuming an epidemic form are entirely obscure. None of the suggested explanations are adequate, and the only fact definitely known about the contagiousness of the malady is that, so far as sporadic cases are concerned, it

is extremely slight. In time of epidemics, he emphasises the great importance of prompt diagnosis of the first cases in a locality; and as it is often clinically impossible to distinguish between this and the tuberculous form of meningitis, lumbar puncture should always be practised. Even if the bacteriological test be negative, the cells of the fluid are polymorphonuclear in the cerebro-spinal form of the disease, lymphocytes in the tuberculous type. In treatment, he relies on free diuresis and saline rectal injections. Among other papers, which it is impossible to do more than mention, are those of Heine on the "Eye Lesions in Cerebro-spinal Meningitis" (*Berl. klin. Wchnschr.*, 1905, June 19), which contain copious references to the literature; Bailey on "Cryoscopy of the Cerebro-spinal Fluid" (*Med. Rec.*, N. Y., 1905, February 11), which, so far, has been of no practical use; and Seibert (*Med. Rec.*, N. Y., 1905, June 17) advocating *rectal injections of sodium salicylate* as a useful therapeutic agent.

SURGERY.

UNDER THE CHARGE OF

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On the Treatment of Cystitis by Instillations of Oil of Goménol.

Haim (*Ann. d. mal. d. org. génito-urin.*, Paris, 1905, June), in his Thèse de Paris, 1905, relates his experience in the treatment of cystitis, particularly that of tuberculous origin, by goménol. This drug, he considers, takes a very high place among the therapeutic agents directed against vesical inflammations. From physiological experiments it has been shown to have no toxic or caustic action, and that when employed as instillations of gomenol oil, 10 to 20 per cent., it is absolutely innocuous. The oil is a powerful antiseptic, and, in addition, is analgesic. It may therefore be employed to lubricate urethral instruments. When instilled into the bladder the painful symptoms are ameliorated, and may even disappear completely, and the patient desires the repetition or continuation of the treatment. The capacity of the bladder increases, and the frequency of micturition is diminished. Diminution or even disappearance of certain pathogenic bacteria is observed. On cystoscopic examination, it is found that the vesical lesions improve more rapidly, as a rule, than under the influence of the antiseptic agents generally employed. The general condition of the patient, often precarious at the beginning of treatment, improves coincidently with the amelioration of the local lesions. Cathelin, who criticises Haim's paper, expresses a favourable opinion of the method of treatment advocated in it.

The Relation of Gonorrhœal Rheumatism to Seminal Vesiculitis.

Eugene Fuller (*Ann. Surg.*, Phila., 1905, June) expresses his opinion that gonorrhœal rheumatism is a systemic infection, the source of which is genito-urinary, and which bears no connection at all to acute inflammatory or to muscular rheumatism. He not only believes that the gonococcus plays a secondary part in the production of this particular form of rheumatism, but holds that gonorrhœal rheumatism, so called, can exist entirely independently of the gonococcus. In his opinion the part which the gonococcus plays is that it allows other germs to enter the system from a genito-urinary source. He has observed on a considerable number of occasions all the clinical symptoms of gonorrhœal rheumatism develop subsequent to surgical instrumentation, or treatment which has awakened an acute inflammatory reaction in connection with old quiescent lesions of the seminal vesicles. He admits that in these cases the original lesions were probably gonococcal, but believes that the gonococcus had long before been eliminated.

The author has recently been attempting to discover whether the systemic infection takes place from any special focus or from the general mucous surface. He is now strongly of opinion that in the male it enters from a special focus of inflammation in the seminal vesicles. He supports this opinion by observations made on fifteen cases of gonorrhœal rheumatism in the male. In twelve of these the only discoverable lesion was in the seminal vesicles; in one there was a marked seminal vesiculitis, and a subsiding inflammation of the mucous surface; and in two the mucous inflammation predominated. Acting on his belief, Fuller has treated a number of his cases of gonorrhœal rheumatism by the operation of seminal vesiculotomy, which consists in exposing the vesicles from the perineum, making a longitudinal incision into each, and, after gentle curettage, packing the cavity with sterilised gauze, and establishing drainage in the usual way. "By means of this surgical procedure," he says, "all systemic absorption from the seminal vesiculitis has been immediately checked, and a resolution of the genital lesion has promptly followed. Almost immediately in all these cases, the active symptoms of gonorrhœal rheumatism have wholly disappeared." Firm manipulation of the parts previously affected, and movement of the joints, have been painless at the end of twenty-four to forty-eight hours. At the end of two weeks, when the patients have been allowed out of bed,—that being the usual period of rest demanded by the operation,—they have all been able to walk about and to leave the hospital free of their gonorrhœal rheumatism.

The author mentions that, after the wound has healed, a urethral discharge is apt to reappear. This should be left absolutely alone, and it will disappear in a few weeks. Any attempt to heal it by local measures is attended with risk of recurrence of the vesiculitis, and probably of the rheumatism.

"An Operation for the Cure of Chronic Bursitis."

Hoffmann (*N.Y. Med. Journ.*, 1905, May 6) has made use of a simple method of operating in cases of prepatellar bursitis for nine years, and reports the results in one hundred and four cases. His method consists in puncturing the bursa with a small sharp-pointed knife, thoroughly scarifying its walls, expressing the fluid, and bringing the walls into contact by means of a pad fixed with adhesive plaster, which is retained for about a fortnight. This causes the surface to adhere, grow together, and so obliterates the bursal cavity. The patient need not be confined to bed during the treatment, but may attend to any work except such as involves kneeling. In ninety-eight cases this plan was primarily successful, in two it had to be repeated twice, and in four three times. The operation is particularly adapted for prepatellar bursitis, because firm pressure can easily be maintained against the bone. Bursæ in other situations do not yield so readily, owing to the difficulty in maintaining efficient pressure.

OBSTETRICS AND GYNÆCOLOGY.

UNDER THE CHARGE OF

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Indications for Pubiotomy.

V. Franque (*Munchen. med. Wchnschr.*, 1905, March 9) reports two cases performed for contracted pelvis instead of craniotomy. The indications for this operation over those of symphyseotomy and Cæsarean section are, slight degrees of pelvic contraction, allowing of version or forceps when the pelvic ring is slightly widened. It takes no longer than craniotomy, and there is the great advantage of obtaining a living child. Further, the pubiotomy wound is not so readily infected from the genital tract as that after symphyseotomy.

Hernia of the Ureter.

Carli (*Gazz. med. ital.*, Torino, Nos. 40, 41) refers to the rarity of this condition, which means the protrusion of the ureter through a hernial opening. It never protrudes alone, but accompanied by hernia of the omentum or intestine, inguinal or crural. Carli reports three cases. Hernia of the ureter, combined with hernia of the bladder, is relatively frequent as inguinal, but unknown as crural.

Endometritis Post-Abortum in a Girl æt. Eleven.

Schultze (*Centralbl. f. Gynäk.*, Leipzig, 1905, No. 16) reports the following case. Menstruation had not been established, and the first hæmorrhage from the genitals was the result of an abortion. This was followed by profuse menorrhagia, for which the uterus was curetted. Microscopic examination of the scrapings showed them to be decidual. After this treatment menstruation continued regular every month.

Rupture of the Uterus.

Valenta (*Centralbl. f. Gynäk.*, Leipzig, 1905, No. 6) reports fourteen cases of complete rupture of the uterus in 1350 labours. Of eight cases operated on, three recovered. Valenta holds that if the child is still in the uterus it should be delivered by the natural passages; but if it has passed entirely into the abdomen, immediate laparotomy is the best treatment. In five cases he performed supravaginal hysterectomy with extraperitoneal treatment of the stump, which is the quickest, and, he thinks, the safest way of dealing with the ruptured uterus. He sutured the laceration in one case, and in two others extirpated the uterus.

Eclampsia and Decapsulation of the Kidney.

Cavaillon (*Centralbl. f. Gynäk.*, Leipzig, 1905, No. 6) reports the following case:—Primipara had fits after the uterus had been emptied by forceps. Cavaillon performed bilateral decapsulation of the kidneys with good effect. The fits ceased, and the patient left hospital five weeks after operation. Such treatment, in addition to curing the fits, may prevent the necessity for terminating pregnancy before full time.

Sterility in Women.

Bumm (*Deutsche med. Wchnschr.*, Leipzig, 1905, No. 8) thinks the commonest causes of sterility in women to be gonorrhœa and maldevelopment of the pelvic organs. Delayed development is best treated by the systematic and prolonged application of the constant current. He has had good results in twelve such cases. In gonorrhœal cases, the prevention of the extension of the inflammation upwards is most important. Intra-uterine treatment should be avoided. In recent involvement of the tubes, rest and ice to the abdomen give the best results. It is only when the tubes become converted into pus sacs that all hope of curing the sterility must be given up.

Bilateral Tubal Pregnancy.

Jayle (*Centralbl. f. Gynäk.*, Leipzig, 1905, No. 9) operated successfully for this condition in a primipara, æt. 34. Both fœtuses were obtained. The older one still remained in the tube, while the most recent one had ruptured. Jayle collected twenty-nine cases, but only in ten could both fœtuses be discovered. In twenty-one cases the interval between two

pregnancies could be still determined. No case of simultaneous conception in both tubes, nor of simultaneous vitality of two ectopic fœtuses, has yet been reported.

The Therapeutical Action of Aspirin.

Chidichimo (*Ann. di ostet.*, Milano, 1905, April) gives the results of his experience with this drug. He finds it as salicylic acid in the urine and synovial fluids, but not in the milk of women to whom it has been administered. The drug renders uterine contractions less severe, and is valuable in dysmenorrhœa of nervous uterine origin, or from diseased appendages. It is useful in painful menstruation of young women, administered before the occurrence of menstruation.

The Remote Results of Mechanical Dilatation of the Cervix.

Lichtenstein (*Arch. f. Gynäk.*, Berlin, 1905) has examined eighteen women some time after instrumental dilatation of the cervix with Bossi's dilator, and found no evidence of injury from the instrument. In four cases there was a small, and in two, larger lacerations of the portio, but no parametric change could be discovered which could be attributed to the means used to effect dilatation.

THERAPEUTICS

UNDER THE CHARGE OF

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AND

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On the Toxic Effects of Theophyllin Preparations.

Schlesinger has used theophyllin in various forms as the pure salt (theocin), as sodium-theophyllin, as theophyllin sodio-salicylate, and as theophyllin sodio-acetate. His experiences date from the year 1902; and as he has treated several hundred patients with these preparations, he claims that he is in an excellent position to judge its side-effects. He states that theophyllin is one of the most powerful diuretics we possess. It acts best in cardiac cases, but is also useful in renal conditions; in the latter condition it should not be used if there is severe headache or vomiting and diarrhœa, as in these circumstances it is difficult to determine the onset of intoxication symptoms. The diuretic action is rapidly established, but passes off soon after the exhibition of the drug is stopped. Schlesinger has recently modified his former opinion that theophyllin has no effect on inflammatory effusions. In

several cases of pleurisy it caused marked increase in diuresis, with coincident diminution in the amount of the effusion. On the other hand, he has never yet seen a distinct effect produced in an effusion from peritonitis or in ascites due to hepatic cirrhosis.

As regards toxic action, the patients frequently complain of oppression in the stomach, loss of appetite, nausea, and vomiting. The gastric disturbance is greater if the drug be administered in powder form. Dissolving in water with the addition of aqua menth. pip. or 5 drops of a 10 per cent. solution of lactate of eucaine, often relieves these gastric symptoms. In any case in Schlesinger's experience they cease within twenty-four hours of stopping the drug. His impression is that they are least likely to occur if the sodio-acetate combination is used.

Diarrhœa after theophyllin is common. As a rule, this does not cause much inconvenience, but occasionally the stools may be very frequent and excessively watery, though without any tenesmus. This tendency is apt to persist for some days after the drug is stopped.

Of special interest is the development of general convulsions of an epileptiform nature with loss of consciousness. Several cases of this nature have been seen by the author, and other writers have had similar experiences. Recently Schmiedeberg has denied that there is any causal relationship between these attacks and the theophyllin. He would explain them as epileptiform attacks occurring in heart disease. But such attacks are very rare, and in the six cases observed by Schlesinger there was no doubt left in his mind that the convulsions were produced by the drug. Consequently, we must bear in mind that in a certain number of cases theophyllin causes a convulsive action from stimulation of the cerebral cortical cells. It is usually possible to prevent the onset of convulsions, since such patients as a rule have prodromal symptoms, as severe headache or a tendency to vomiting. As a further precaution, Schlesinger recommends the use of one of the compounds and not pure theophyllin. The daily dose should be 1 grm., and should never exceed 1·5 grm., dissolved in a large quantity of water.

The drug in these amounts should only be given every second day. On the intervening day a theobromin preparation, as diuretin or agurin, may be used. If a patient taking theophyllin develops headache or sickness, the drug should be stopped immediately. With these precautions there does not appear to be much risk of causing convulsions. —*München. med. Wchnschr.*, 1905, No. 23.

Maretin.

This drug is a derivative of phenylhydrazin. It was originally introduced as an antipyretic, and numerous writers speak highly of its action in reducing the temperature of phthisical patients. One of the more recent writers is Henrich (*Therap. Monatsh.*, Berlin, 1905, No. 3). For keeping the temperature within a moderate range, he recommends two daily doses of 4 grs. In exceptional cases this dose requires to be doubled. At first, if the fever is high, considerable sweating is caused, but this may be checked to a great extent by the simultaneous exhibition of an anhydrotic. With continued use, the sweating in any case is considerably lessened, and in many cases disappears entirely. The fall

of temperature is gradual and prolonged, and there is no collapse or cyanosis. Ulrich (*Heilkunde*, 1905, May) does not substantiate these claims very enthusiastically. He finds that, as with all antipyretics, there is more or less severe sweating. There was occasionally noted slight cyanosis. His observations were made on febrile conditions of various origin. Of special interest is his confirmation of Sobernheim's statement that the drug exerts a specific action on rheumatic fever.

Sobernheim's paper appeared in the *Deutsche med. Wchnschr.*, Leipzig, 1905, No. 15. It is based on seven cases of rheumatic fever. Maretin apparently exerted a specific anti-rheumatic action. The pain and fever were rapidly relieved, and this relief was permanent. In gonorrhœal arthritis the same effect is not produced. The fall of temperature and the relief of pain is only transient, and on stopping the drug these symptoms reappear. The doses employed to produce the specific anti-rheumatic action were small. For the first day or two 7 grs. may be given twice daily. Under this dosage all pain and fever disappears in the course of the next two or three days. Later, 3 to 3½ grs. may be given for a day or two, and then all treatment is stopped. The only unpleasant action was the occasional production of profuse perspiration. Maretin is a comparatively cheap drug. It is important to remember that the urine contains reducing substances after the use of maretin.

Iothion.

For percutaneous use this preparation is recommended. It is di iod. hydroxy propan, a yellowish oily fluid, which is only slightly soluble in water (1 in 80), but more so in olive oil (1 in 1½) and glycerin (1 in 20). It is miscible in all proportions with lanolin, chloroform, alcohol, ether, and benzol. The watery solution decomposes very slowly even in the presence of acid, but weak alkaline solutions, corresponding to the alkalinity of the blood, rapidly convert the organic iodine into an inorganic form by a process of saponification. Iothion contains 80 per cent. of iodine.

Wesenberg (*Therap. Monatsh.*, Berlin, 1905, April) has studied the absorption after external applications to the skin of two healthy individuals. He finds that iothion is readily absorbed, and is excreted in the saliva and urine. The preparation can either be applied in a pure form or mixed with lanolin, vaselin, or olive oil. The iodine reaction is obtained in the excretions within an hour; and after a single application the excretion is at its maximum during the first ten hours, though the excretion lasts for four days. With oral administration of KI, about 75 per cent. is excreted in the urine. After percutaneous use of iothion, from 14 to 29 per cent. is excreted. If the application be continued for several days, either pure or mixed with an oily or alcoholic basis, the excretion gradually rises, so that after six days' use about 40 per cent. of the iothion applied is excreted. Prolonged application to one place saturates the skin and clogs up the pores with lanolin, checking the absorption. To secure good results, the site of application should be frequently changed. An excretion of 40 per cent. probably corresponds to an absorption of 50 per cent., since even with oral

administration a certain proportion is retained in the tissues. Iothion enables us to introduce into the system by inunction a considerable quantity of iodine. It is suitable for those persons who are liable to iodism, as its use in such individuals does not seem to be followed by iodism.

Ravasini and Hirsch (*Arch. f. Dermat. u. Syph.*, Wien, 1905, Nos. 2 and 3, Bd. lxxiv.) have made an extensive trial of iothion on upwards of fifty patients. They found pure iothion rather irritating, and preferred an ointment consisting of 1 part iothion to 2 parts each of lanolin and vaselin. This only caused a reaction in one case, but application to the scrotum causes some burning. In one instance, 20 grms. of the ointment caused iodism. In all the patients, iodine could be demonstrated in the secretions even when only very small quantities were applied to small areas of the skin. The absorption is fairly rapid. If applied in the forenoon to the skin, a distinct iodine reaction is obtained in the secretion by four o'clock in the afternoon. It commences within three hours of the application of the ointment, and is gone in twenty-four hours. These authors, too, note that the pores became easily blocked, checking absorption, so that if the ointment is being constantly used every second or third day the skin must be most carefully cleansed.

Therapeutically the authors make the following observations. In enlarged inguinal glands after chancres, the use of the ointment combined with calomel injections always caused absorption of the swelling, even in a case where on the other side the gland had suppurated. The same good action was observed in lymphadenitis after soft chancres. Ten patients with gonorrhœal epididymitis were treated. These cases were selected as chronic cases with no severe pain, so that the dressings might be readily changed. The ointment was applied daily to the scrotum, and the part was covered with absorbent gauze, cotton-wool, and protective tissue. The results were very successful. In from four to eleven days the inflammatory thickening disappeared. In a case of tubercle of the testicle no remedial action was got, but in the only instance in which it was tried in tertiary gummata, the result was very successful.

The authors conclude that in iothion we have an excellent preparation for introducing iodine into the system through the skin.

Poisoning with Veronal.

Kuhn reports the case of a woman, æt. 31, who, for ovarian trouble and sleeplessness, received nightly doses of 7·5 grs. of veronal for over three weeks, with the occasional intermission of a night. The toxic symptoms consisted of fever, redness, and heat in the face. The drug was stopped, but next day there was great swelling of the face and lips, redness, itching, and burning sensation. On the breast and upper arm an eruption resembling measles appeared, and gradually spread, confluescing to large raised red patches on the extensor surfaces. The eruption was extremely itchy. The chief site of the eruption was the upper arms. The patches on the forearms remained discrete, and on the lower extremities only a few isolated papules appeared. The mucous membrane of the mouth and œsophagus was also implicated. The mouth

was swollen and very painful, so that it could only be opened with difficulty, and swallowing was very painful. As far as the mucous membrane could be examined, it was red, swollen, and covered with small vesicles. The inner edges of the lips desquamated. There was no running at the nose or conjunctivitis. The temperature remained high for six days, when it gradually subsided by lysis, and all the symptoms disappeared. During the whole course the urine remained unaffected. A few cases have been reported where veronal has caused rash on the skin, but so far as is known this is the first case where the mucous membranes have been implicated.—*Hosp.-Tid.*, Kjøbenh., 1905, February, in *Deutsche Med.-Ztg.*, Berlin, 1905, No. 36.

The Action of Bitters on Gastric Secretion.

The vexed question of the effect of bitter substances on gastric secretion has been reinvestigated by Borisson. He points out that many former investigators have been at fault in the arrangement of their experiments. A favourite method was to determine the effect of direct intravenous injection on the secretions of the digestive glands. Others, again, introduced the bitter substances into the stomach by means of a tube, thus eliminating any mouth-action. Generally speaking, most investigators used too large doses, forgetting that in practice only small quantities are employed for the bitter action. For his investigations Borisson used dogs in which the œsophagus had been cut through and the upper end fixed to a skin incision. The lower end was used to form a gastric fistula. The bitter substance was poured on a small piece of cotton-wool and put into the dog's mouth. After being chewed and swallowed, it immediately escapes by the open end of the œsophagus. The effect of the bitter alone, apart from food, was trifling. There was copious salivation, but no secretion of gastric juice. The action, in relation to food, was then determined. In these experiments the dog is given meat, which is chewed and bolted, but of course does not reach the stomach. Bitters, given half an hour and upwards before such a meal, lead to a diminution in the quantity of gastric juice secreted, as compared with the control experiment made on the same dog, but without any bitter. When the bitter is given immediately before the food, the secretion of gastric juice is stimulated. In a control series of experiments, feeding alone caused in the next two hours a secretion of 101 c.c. of gastric juice, while during the same time, when the bitter was given immediately before the food, the average secretion was 130 c.c. The two curves ran a perfectly parallel course, and the bitter gastric juice, in respect of acidity and digestive power, was as strong as the control juice. Borisson thinks that the increase in secretion is due to the stimulation of the taste fibres, by the bitter substance rendering them more susceptible to the stimulation of food. It is comparable to the action of saline solution in frogs. If the central nervous system be destroyed, and the front legs be immersed for a few minutes in salt solution, they become more sensitive to the stimulant action of acid solutions and give a more energetic response. Possibly, in a similar way, the preliminary action of the bitter intensifies the stimulant effect of food. The effect does not last long; hence, in practice, the bitter

should be given in a fluid form immediately before food. The amount of the bitter used should be small.—*Arch. f. exper. Path. u. Pharmakol.*, Leipzig, 1904, July.

DISEASES OF THE EAR, NOSE, AND THROAT.

UNDER THE CHARGE OF

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Infective Thrombosis of the Lateral Sinus.

Cases of middle-ear suppuration, complicated by infection of the sigmoid sinus, always demand the most careful consideration on the part of the surgeon. Reports of such cases, which present unusual features, are consequently of special interest. M'Kernon publishes the notes (*Trans. Am. Laryngol. Rhinol. and Otol. Soc.*, 1904) of a case of primary involvement of the jugular bulb following an acute otitis media, in which there were no mastoid complications, the mastoid cells being perfectly healthy. The child was 2 years of age. In this case the infection had passed from the middle-ear cavity directly into the jugular bulb, and the sigmoid sinus had become implicated in this way, and not through the mastoid cells, as is commonly the case. The author had met with two other cases of a similar nature. Moreover, in all three, the complication occurred in the course of an acute otitis media, and in none of them was there any rigor. One of the latter was an infant 6 months of age, while the second was 14 months. In the same Society's *Transactions* it is interesting to note that a case of a somewhat similar nature is reported by Day. The patient was a lad of 11 years, who suffered from acute inflammation in one ear, which was followed by extensive thrombosis of the sigmoid and lateral sinus, without any disease of the mastoid cells; and the condition was characterised, like the previous cases, by the absence of rigors. The absence of rigors throughout the illness is deserving of mention, as considerable diagnostic importance is laid upon the presence of such. A somewhat similar case, in which there was an entire absence of rigors, occurred recently in the practice of one of us. The patient was a girl 11 years of age, with a history of chronic middle-ear suppuration; mastoid symptoms developed, and the cells were found to contain pus. The lateral sinus was exposed in the abscess cavity, and was seen to pulsate. After the mastoid operation, the temperature remained normal, the patient had no rigor; nor, indeed, was she conscious of any sensation of chilliness. On account of the development of considerable tenderness in the anterior triangle of the neck, associated with enlargement of the glands along the anterior border of the sterno-mastoid muscle, the patient at the same time showing a

marked tendency to drowsiness, the internal jugular vein was exposed in the neck, and a portion of it removed. It was found collapsed, but contained a small clot. A septic clot was removed from the lateral sinus, and the patient made an excellent recovery.

A. B. Duel reports some interesting cases bearing upon the diagnosis of sigmoid sinus thrombosis (*Laryngoscope*, 1905, January). A girl, æt. 6 years, developed broncho-pneumonia, and during her illness there supervened an acute suppurative otitis on the left side. She recovered from the pneumonia, but mastoid symptoms developed, necessitating the performance of the mastoid operation. From this date the patient suffered from a violent and incessant cough, which could not be accounted for by any signs in the lungs. Repeated physical examination failed to detect any pulmonary condition. The temperature showed considerable fluctuations, but it was not regarded as significant of sinus thrombosis. The mastoid wound looked healthy, as did also the wall of the lateral sinus, which had been exposed at the operation. There was slight tenderness over the left internal jugular vein, but in a child of 6 it was somewhat difficult to determine this accurately. The fluctuations in temperature were not associated with any rigor or sweating. An exploration of the sigmoid sinus was carried out, and a disintegrating clot, extending from beyond the knee to the jugular bulb, was found. The vein in the neck was dissected out, the sinus was curetted and packed, and recovery took place. The difficulty in this case was the existence of an incessant cough, coming on after a broncho-pneumonia, and the absence of signs usually regarded as typical of sinus thrombosis.

A second case reported by the same writer showed symptoms of sinus thrombosis, but was regarded as a case of pneumonia. An acute otitis media developed in both ears during influenza. No mastoid symptoms were observed, nor did physical examination show any evidence of thrombosis. While no physical signs could be detected in the lungs, there was typically pneumonic blood-stained sputum. With each rise in temperature there was a distinct chill, and profuse sweating occurred after each fall. The patient made a complete recovery without any operative interference. Duel was of the opinion that a thrombus had formed in the lateral sinus, and that the patient was able to overcome the septic poisoning.

Ocular Manifestations in Accessory Sinus Inflammation.

While the more striking and advanced ocular symptoms and signs of disease in the nasal sinuses are now generally recognised, there remains, nevertheless, a class of case in which the nasal condition is not very evident, and where ocular manifestations often precede all other clinical evidence. This aspect of the association between affections of the accessory cavities and the eye has been recently brought under our notice by Posey of Philadelphia (*Journ. of Eye, Ear, and Throat Dis.*, 1905, March–April). The writer has collected a number of cases which presented some of these early symptoms, and has classified them into groups. These may be briefly considered here.

In the first series we find that there are cases of disease of the ethmoidal, sphenoidal, and antral cavities, evidenced by a moderate

stasis in the circulation of the optic nerve, as observed by ophthalmoscopic examination and by an interference with vision. As an example of this, the following case may be quoted. A lad, 17 years of age, suffered from persistent and severe supra-orbital headache, which was aggravated on stooping. His memory was poor, and he was unable to concentrate his attention upon his studies. Ophthalmoscopic examination showed slight swelling of the left optic nerve, with choking of the lymphatic vessels. The left pupil was dilated, and somewhat sluggish to light stimulus. Nasal examination revealed the existence of inflammation in the ethmoidal and sphenoidal sinuses. Treatment of the sinus condition was followed by a marked and rapid improvement in the symptoms, and after several weeks, vision and the light sense returned to normal, though the ophthalmoscopic signs persisted. A number of other cases are quoted by the author to illustrate this group.

In the second group of cases the fifth nerve is involved. A patient, 29 years of age, complained of great pain over the left eye, which was especially severe in the morning; it radiated to the back of the eye. As the result of swimming and diving, he had got a great deal of water into his nose, and, with the onset of his neuralgic pains, he had contracted a severe nasal catarrh. There were no ophthalmoscopic changes visible, and vision and ocular movements were normal. Examination of the nose revealed considerable hypertrophic rhinitis associated with a purulent condition of the ethmoidal cells. Treatment of the nasal condition was followed by relief of the pain.

Posey next turns to those cases in which œdema of the eyelids is the only ocular sign of disease of the sinuses. Of the cases reported, the following may be cited. A woman complained of intense supra-orbital headache, and of drooping of the eyelids. On examination, the upper lids of both eyes were found considerably swollen, more pronounced in their nasal part, and especially noticeable in the right eye. There was no redness, and no sign of inflammation; the urine was normal. An inflammation of the ethmoidal cells and sphenoidal sinus was diagnosed. After suitable treatment, the puffiness of the lids and the pain in the head rapidly improved. An interesting case of œdema of the right upper eyelid is also reported, in which pus was found in the right maxillary sinus. The presence of œdema in that situation, in association with antral trouble, one would naturally regard on anatomical grounds as an unusual occurrence.

The fourth group of cases contains those in which there is paresis or actual paralysis of the extra-ocular muscles, associated with accessory sinus disease. In one instance the patient suffered from paralysis of the right superior rectus and levator palpebræ muscles. The right upper eyelid drooped, and there was double vision, one object appearing higher than the other. A diagnosis of ethmoidal cell suppuration was made, and after the free drainage of a large quantity of pus, the ptosis disappeared, though at the time of writing the superior rectus muscle still remained paralysed.

The writer concludes his interesting paper by referring to two other conditions of the eye associated with sinus suppuration. The one condition is that of migraine ophthalmoplegique, an affection characterised by violent migraine, nausea, vomiting, and fever, along with paralysis

of one or more branches of the oculo-motor nerve. In a case presenting such symptoms, which came under the care of the writer, there was a marked catarrhal condition of the ethmoidal cells. The last group of cases discussed is that of pseudo-lachrymal abscess. The purulent matter from one of the sinuses, frontal, ethmoidal, or maxillary, may find its way, after escaping through the wall of the sinus, to the region of the tear sac. The differential diagnosis in these cases is not always easy, and a careful examination of the nose and its sinuses is called for.

Petroleum in the Treatment of Ozæna.

Bobone suggests the use of petroleum in the treatment of ozæna (*Ann. d. mal. de l'oreille du larynx, etc.*, Paris, 1905, April). He considers that it acts both as a bactericidal agent and as a stimulant to the mucous membrane. By the addition of strychnine the stimulating application is augmented, while eucalyptus oil may be added so as to modify the odour of the ozæna. After thorough irrigation of the nasal cavities, in order to remove the crusts, the nose is cocainised, at any rate in the earlier part of the treatment. The petroleum is then applied all over the mucous membrane of the nose as thoroughly as possible, on wool mops mounted upon probes. The patient may after a time learn to make the application himself, but should remain under observation. The effects of the treatment are soon appreciable. The crusts become less, and the odour disappears. Later, the mucosa becomes more vascular, and the secretion more fluid. The writer regards the treatment as one which ameliorates the condition.

PUBLIC HEALTH.

UNDER THE CHARGE OF

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Agricultural Anthrax.

In a valuable communication on this subject, Delépine (*Pub. Health*, London, vol. xvii. No. 8) gives his views as to the manner of spread of the disease in agricultural districts, and makes suggestions for its better control. From a study of the distribution of anthrax in Great Britain, it appears that the rate of incidence is not materially influenced by geographical situation, density of cattle, or amount of manured land. According to returns of the Board of Agriculture, there has been a steady increase of anthrax, although there has been a gradual diminution in the total amount of manured land.

From a table giving the average yearly incidence of anthrax per 100,000 cattle during the six years 1897–1902 inclusive, the number of persons employed in the wool, hair, hide, and skin trades, and the number of cases of industrial anthrax in each county during the five

years 1899 to 1903, it is seen that Haddington, Edinburgh, Elgin, Aberdeen, Nairn, Forfar, Banff, and Westmorland are the most severely affected counties as regards agricultural anthrax, "although they are comparatively free from industries which may be reasonably considered as possible sources of infection." Clackmannan, Peebles, Ayr, Lanark, the West Riding of Yorkshire, Cheshire, Wiltshire, Cumberland, Worcester, Nottingham, and Gloucester are only slightly or moderately affected, although in these latter counties more or less important wool, hair, hide, skin, and leather, and artificial manure works are carried on.

The following are the figures for the counties named:—

County.	Anthrax—Yearly Average Number of Cases per 100,000 Cattle, 1897–1902.	Number of Persons Employed in Wool, Hair, Hide, and Skin Trades.	Number of Cases of Industrial Anthrax, 1899–1903.
Haddington	85	41	0
Edinburgh	73	1,516	0
Elgin	43	247	0
Aberdeen	43	1,251	0
Nairn	38	—	—
Forfar	36	228	0
Banff	32	227	0
Westmorland	25	544	0
Clackmannan	0	3,810	0
Peebles	1	2,083	0
Ayr	2	2,949	1
Lanark	4	4,598	9
West Riding	8	194,667	66
Cheshire	4	1,104	0
Wiltshire	5	2,392	4
Cumberland	5	1,286	0
Worcester	6	8,074	15
Nottingham	7	995	0
Gloucester	4	3,711	3

Such statistics furnish no evidence that the carrying on of industries involving the use of hides, skin, wool, blood, bones, etc., tend to either directly or indirectly increase the incidence of agricultural anthrax, and Delépine is of opinion, from the analysis of published statistics, that "there is nothing supporting the view that the occurrence of anthrax is chiefly determined by the occasional introduction of infected food or manure into the districts affected; on the contrary, the grouping of large numbers of cases in limited districts indicates that certain regions become specially infected, and that the disease spreads from centres of infection intimately connected with these localities."

As regards infection by feeding-stuffs, he states that in connection with five outbreaks of anthrax he examined eight samples of cake, of home and foreign manufacture, and all were free from anthrax spores and bacilli. Four samples of oatmeal suspected of carrying the infection were also examined, and were also found free from anthrax. He considers that the only facts which explain the manner in which the

disease has clung to certain localities, without remaining confined to a very limited number of farms, are those relating to the thoughtless or illicit disposal of carcases by farmers, butchers, and knackers. He points out that when diseased animals are slaughtered at farms, or the dead animals are sold, proper precautions are seldom taken. The animal is often bled and skinned in the field or stable, and if the carcase cannot be sold it is carelessly buried or thrown on a midden, contaminating manure, which will probably be used in the neighbourhood. The offal may be used for pig feeding, causing infection and death of some of the pigs, giving further specific pollution. Rats, and still more mice (which are more susceptible to anthrax than rats), may feed on the offal cast on such middens. Thus there are many chances of spread of the disease.

In combating the spread of the disease, Delepine considers the following points should be attended to:—(1) Notification should be enforced of all cases of death from acute illness, or any other cause which cannot be clearly accounted for by ordinary accident, and of cases of illness which render *slaughter at the farm* necessary (not including accidents requiring slaughter of the animal), and a small fee might be paid to the farmer or veterinary surgeon for so doing. (2) The veterinary inspector recognised by the Authority should give to the owner or farmer a certificate of the cause of death, stating whether the carcase can be sold for certain stated purposes, or must be destroyed under supervision. (3) All anthrax carcases should, as recommended by the Board of Agriculture, be burned. (4) The slaughter of animals or disposal of carcases in unlicensed places should be made illegal. (5) No butcher, knacker, or manufacturer should be permitted to buy a carcase at an unlicensed place without seeing the certificate of death. (6) The County Authority should be immediately notified of any case of human anthrax occurring in any district receiving farm products from any part of the county, so that investigation may be made, and that the district and county medical officers of health should be informed without delay of the occurrence of outbreaks. (7) The factory and markets inspectors of districts or towns concerned in the matter should be acquainted with the occurrence of outbreaks, so that special care may be taken in the inspection of carcases and animal products from the affected district. Such co-ordinated investigation would lead, he believes, to a diminution in the number of concealed and overlooked cases, and allow of the discovery of the source of infection and the application of preventive measures.

The Antiseptic Value of Common Soap.

Dr. Robet (*Rev. d'hyg.*, Paris, tome xxvii. No. 4) gives the results of experiments recently made by him as to the bactericidal action of common soap. His experiments were made with white soda soap, which had been proved by analysis to contain no free alkali. Two micro-organisms were used for the tests, namely, *Staphylococcus pyogenes* and *Bacillus typhosus*. In testing the bactericidal power of the soap solutions, he added to 2 c.c. of the soap dilution in sterilised tubes one or two drops of dilute broth culture of staphylococcus or *B. typhosus*,

shook up thoroughly the solution, and withdrew by means of the looped platinum needle at varying times precisely equal amounts, smearing these on the surface of agar, and incubating the agar so treated. Experience proved that the minute quantity of soap transferred by the needle to the agar medium had absolutely no effect on the growth. The advantage of this method was that he was able to observe the diminution in the number of living elements, and the decrease in fertility showing the progressive destructive action of the solutions on the micro-organisms contained in them. As regards *Staphylococcus pyogenes*, he found that after two hours' immersion in 1 per cent. solution of soap, some of the organisms were killed, and that after twenty-nine hours the great majority, but not all, were killed. Immersion in a 5 per cent. solution killed all the staphylococci in less than twenty-four hours. Thus, as regards the staphylococcus, soap in 1 per cent. solution is not very active, but a 5 per cent. solution is by no means without bactericidal power.

Typhoid bacilli were not all killed, even after three hours' immersion in 1 per cent. soap solution. In 5 per cent. solution they were all killed within ten minutes if the solution was of a temperature of 25° C., and in three minutes if at a temperature of 37° C.

In all cases, Rodet states that the time necessary for killing all the bacilli depends to a certain extent on the number of bacilli introduced, sterility being more quickly obtained when only a small number is added. The bacilli are not all killed *en masse* at a given moment, but are successively acted upon, showing the unequal resisting power of different elements in the same culture. In his conclusions he takes the side of those who recognise soap as having real antiseptic value, and is of opinion, from the experiments he made, that while soap solutions are not in practice sufficient to destroy very resistant germs, they are of real value as disinfectants. The bactericidal action is rapid and energetic on certain micro-organisms, such as *B. typhosus*, and to a less extent on staphylococcus. He points out that strong solutions are perfectly attainable in practice, as ordinary soapy lather has a strength exceeding 10 per cent., and consequently much above that of the solutions with which he experimented. For disinfection of the hands, washing with soap, assisted by brushing, as practised by surgeons, and prolonged for some minutes, is far from being useless as a means of disinfection.

"Return" Cases of Scarlet Fever.

The experience of Dr. Anderson, Medical Officer of Health, Wortley Rural District ("Pub. Health, London," vol. xvii. No. 6), is of interest as a contribution to the much debated question of the value of hospital isolation in scarlet fever, and especially as regards the prevention of "return" cases. During stay in hospital, each patient is provided with a separate set of requisites for his *sole* use, such as syringes, enamel bowls, nose and ear nozzles, towels, throat cloths, etc. These are kept in the patient's locker; and bowls, nozzles, etc., are boiled, after use, for five minutes and replaced in the locker. If the patient has ear discharge, after plugging the ear is securely bandaged. The fingers and nails are carefully cleaned and disinfected, as Dr. Anderson believes secondary

rhinitis is frequently produced by "picking the nose." Toys are kept separate as far as possible, and all wind instruments are prohibited. The nurses, after attending each patient, wash their hands and immerse them in izal lotion. Prior to discharge, the patient has an izal bath; the throat, ears, and nose being carefully syringed. All utensils used by him are thoroughly sterilised before being used for a fresh patient. No attention is paid to the number of days which a patient has been in hospital, the completion of primary desquamation and freedom from all discharges and sores being taken as the only guides indicating probable freedom from infection. Anderson points out that desquamating skin may become infected by discharges, etc., "and no one can pretend that a desquamating skin is as easy to disinfect as one in which the process has been completed." He is entirely against the tendency, in some quarters, to paying no attention to desquamation, and discharging the patient after four weeks' stay in hospital, since "when patients have been discharged freely desquamating only a few return cases have occurred." Secondary cases not infrequently occur at the end of four weeks when patients are treated at home, and "a margin of ten days or a fortnight is necessary even if we accept four weeks as the average duration of infection." When the scarlet fever wards become overcrowded, formalin spraying is resorted to.

During the years 1900 and 1901, prior to the adoption of these methods, 281 cases of scarlet fever were discharged, and of these fourteen, or 4·9 per cent., gave rise to "return" cases, including under that term every case where another case has occurred within four weeks of the patient's return home. Since the adoption of the measures referred to, 222 cases have been discharged in the years 1902, 1903, and 1904 (nine months), and only one "return" case (0·4 per cent.) has occurred.

As showing the benefit accruing to individual families from removal of the patient to hospital, as regards protection of the remaining susceptible children, Dr. Anderson's figures are striking. For home treated cases, of 123 susceptible children under 15 years of age remaining in the house, twenty, or 16·2 per cent., subsequently became infected. For hospital cases, of 416 susceptible children under 15 years of age remaining, only thirty two, or 7·7 per cent., subsequently developed the disease. The incidence of scarlet fever on susceptible children remaining in the house was thus more than double when the case was treated at home than when the patient was removed to hospital.

REPORTS OF THE MEDICAL SOCIETIES.

EDINBURGH MEDICO-CHIRURGICAL SOCIETY.—*July* 5, 1905.—Professor CHIENE, C.B., President, in the chair.—Dr. ALLAN JAMIESON showed a case of granulosis rubranasi.—Dr. W. T. RITCHIE showed for Dr. G. A. GIBSON two cases of syringomyelia.—Mr. COTTERILL showed—(1) A man, æt. 36, with a swelling in the parotid region; (2) a case of perforating ulcer of the right foot resulting from peripheral neuritis.—Mr. C. W. CATHCART showed—(1) A patient after wiring a recent fracture of the femur on account of malposition; (2) a patient who has had a very extensive depressed fracture of the skull which had been successfully elevated.—Mr. J. W. STRUTHERS showed—(1) An elderly man after radical cure of inguinal hernia under local anæsthesia; (2) patient after excision of the astragalus for compound subastragaloid dislocation of the ankle.—Mr. J. M. COTTERILL showed—(1) A series of gall-stones; (2) a series of damaged semilunar cartilages removed from the knee-joint.—Mr. ALEXIS THOMSON showed—(1) Specimen from a case of cholecystectomy for gall-stones and pendulous gall-bladder; (2) enlarged prostate and vesical calculus removed by suprapubic operation.—Dr. MICHAEL DEWAR read a paper on "The Recent Epidemic of Influenza." He first gave a brief historical sketch of the malady. The epidemic of thirty years ago was of a very benign type, and there were few fatal cases. Of the three recent epidemics, that of 1889–90 chiefly affected the nervous system, and left behind prostration, mental depression, and organic nervous disease. Many of the victims were never the same again, and not a few died within a year or two. The epidemic of 1898 chiefly affected the heart and the respiratory system, and elderly people suffered most, while children escaped. During the epidemic of the present year he had attended about fifty cases of genuine influenza, excluding ordinary febrile attacks. These began about the middle of January, and ended about the middle of February. He depended for diagnosis on excluding all other diseases, the only other test being the bacteriological examination of the sputum, which was not always a practicable matter. True influenza due to Pfeiffer's bacillus must be distinguished from the milder disease grippe. Influenza was of three types—a cardio-pulmonary, a gastro-intestinal, and a nervous variety. The features of the first were high fever for a day or two, then lower temperature and a return to normal during the second week. There were either bronchial or cardiac symptoms, and both children and adults were equally affected. The gastro-intestinal type generally occurred among children and male adults, and a very constant symptom was pain

in the right hypochondrium and right shoulder. In cases where the nervous system was chiefly affected, the temperature was low and soon became subnormal. The pulse was slow and feeble. A week or two generally elapsed before the normal temperature and pulse were regained. A number of cases illustrating the various types were related. With regard to treatment, Dr. Dewar laid special stress on skilful nursing.—Mr. F. M. CAIRD read a paper on "The Urine Separator of Luys."—Dr. T. D. LUKE read a paper entitled "Remarks on Post-Anæsthetic Sickness," which will appear in an early issue of the Journal.

EDINBURGH OBSTETRICAL SOCIETY.—*July* 14, 1905.—Professor SIMPSON in the chair.—It was agreed to confer the Honorary Fellowship of the Society on Professor Zweifel, Leipzig, Professor Veit, Halle, and Professor Sir W. J. Sinclair, Manchester.—Dr. HAULTAIN read a paper on "A Series of Cases of 'Axial Rotation' in its relation to the Pelvic Generative Organs." He first of all discussed the rotation of ovarian tumours, and showed numerous specimens to illustrate his remarks. He then described in detail a case of axial rotation of the uterus which was the seat of a fibroid tumour. It was the only case he had met with, and the rotation had given rise to very urgent symptoms, necessitating immediate operation. Dr. Haultain showed the specimen he had removed, and discussed the symptoms and the mechanism of production. He said it was not easy to understand the great congestion of the tubes and ovaries, which were in a condition similar to that of the uterus.—Dr. R. C. BURST communicated a paper by a former assistant, Dr. BROWNLEE of Stockton-on-Tees, on "The Germ Content of the Uterus and Vagina during the Normal Puerperium." The paper commenced with a résumé of the literature of the subject, and then Dr. Brownlee described the bacteriological results he had obtained from an investigation of the uterus and vaginal discharge in twenty women during a normal puerperium.—Dr. BARBOUR read a paper on "Endothelioma of the Ovary." He described the case of this rare condition which he had met with, and then discussed very fully the pathology of this form and other forms of cancer of the ovary.—Professor KYNOCH's paper on "A Case of Distension of the Gall Bladder simulating an Ovarian Cyst," was, owing to the lateness of the hour, held as read.

EDINBURGH MEDICAL JOURNAL.

EDITORIAL.

Professional Secrecy.

GREAT BRITAIN is one of the very few countries, so far as we are aware, which does not legally recognise to a greater or less extent the principle of privilege in connection with the relationship of a medical man and his patient.

In France the law on the subject is definite and strict, both in civil and criminal actions. In Germany it is almost equally strict, with certain reservations in criminal cases.

In this country, however, the law concedes no special privilege to medical men in giving evidence in civil or criminal courts, when based on the ground that the matters about which they are asked to give evidence came to their knowledge through private and confidential communication with their patients.

A medical man, therefore, is in exactly the same position as any other witness, professional or otherwise. He must answer any question put to him if the Court so directs, or render himself liable to be committed for contempt.

If he gives false evidence, a witness may be indicted for perjury, but apart from this he is immune from any responsibility in the nature of an action for evidence given in a court of justice. Such immunity in respect of evidence given is one of the necessities of the administration of justice, in the same way that, for a like purpose, the compelling of a witness to attend and give evidence is a necessity.

By a recent decision of the House of Lords, the immunity enjoyed by a witness has been recognised to extend to his precognition, or information given to his agent or counsel for the purpose of preparing the case. This was a novel and important question, and we are glad that it has been so definitely decided in the direction indicated. This question seems to us, however, to have had very little to do with that aspect of the action which gave rise to it, with which the medical profession is more particularly concerned.

We unhesitatingly accord our sincere congratulations to the eminent and honoured member of our profession, who has naturally endured much anxiety, on the final result which has been obtained to an action with the prosecution of which we had no sympathy.

The result has not, however, settled what was in reality the medical question at issue, namely, whether any breach took place of the unwritten law which should guide and control professional conduct in relation to patients. We cannot but regard the case from this aspect as an unfortunate one, and we sincerely regret that advantage was not taken of the incontestable right of a medical man to refuse to give evidence on behalf of parties inimical to a former patient, about matters with which he had become acquainted in a professional capacity, until he was forced into Court by citation and compelled to speak at the direct instance of the judge.

This, we assert, was the proper course to adopt, and the one which we trust will be followed in the future in similar circumstances.

Typhoid and Standing Camps.

THE problem of dealing with outbreaks of typhoid fever in the field has long been recognised as one of the greatest difficulties of campaigning. The great losses suffered by the Germans before Metz, and the widespread prevalence of typhoid among our own troops in South Africa, have proved that an army may often lose more men by disease than it loses in action. The official report of the Medical Commission[1] convened to investigate the causes of the prevalence of typhoid fever during the Spanish War in the various military camps within the limits of the United States, is a most important contribution to the study of the question. It consists of two very bulky volumes, the second of which is entirely devoted to charts and plans. Of the three members composing the Commission, two, we regret to learn, died before completing their work. All the more credit is therefore due to Professor Vaughan for his exceedingly able editing of a mass of information which we believe will long be consulted by those interested in military sanitary science. The report, dealing, as it does, only with troops quartered in standing camps in the United States, is particularly interesting, as showing how difficult it is to control outbreaks of typhoid fever among troops who are not actually engaged in warfare. It goes far, moreover, to prove that to check typhoid fever in armies, we want something a great deal more than even the drastic application of what the late Mr. Ernest Hart used to call the "gospel of the tea-kettle," a recipe

[1] "Report on the Origin and Spread of Typhoid Fever in U.S. Military Camps during the Spanish War of 1898." By Walter Reed, Major and Surgeon, U.S. Army; Victor C. Vaughan, Major and Division Surgeon, U.S. Volunteers; and Edward O. Shakespeare, Major and Brigade Surgeon, U.S. Volunteers. Two vols. Washington Government Printing Office.

which Dr. Leigh Canney in a recent brochure seemed to think would eradicate the fever from troops in the field.

The conditions under which the investigation was made were briefly as follows:—At the outbreak of the American-Spanish War a large number of volunteer regiments were mobilised and located in standing camps in the Southern States. In all these camps there were serious outbreaks of typhoid. The reporters soon found that water, in the majority of instances, could be excluded as a cause. In several camps the water supply was that of adjoining towns, the population of which were not affected by the outbreaks of fever. They also discovered that a large number of cases returned as "diarrhœa" or "malaria" were almost certainly cases of typhoid fever. It will be remembered that in South Africa many cases of typhoid were probably classed as "continued fever" in very much the same manner. The Commission therefore turned its attention to the possibility of personal infection by direct and indirect contact with persons suffering from the disease, and also endeavoured to trace, through the sick reports of no less than 118 regiments, the subsequent history of every case of typhoid, malaria, and diarrhœa. As cases were constantly being moved to base hospitals, in many cases under civilian management, the difficulties of following up all the cases may be imagined.

It is impossible in a brief space to go into the detailed accounts of the history of individual regiments and individual companies. Every case of typhoid in this vast army is tabulated. Every monthly sick return is given, and the special conditions affecting each regiment are noted. In several instances, plans of regimental camps, with the cases marked as dots in the actual tents in which they occurred, are given. The few pages devoted to almost every individual corps will be found most interesting and instructive reading. All we can do here is to summarise the general conclusions arrived at by the Commission.

During the war every regiment composing the First, Second, Third, Fourth, Fifth, and Seventh Army Corps developed typhoid fever. More than 90 per cent. of the volunteer regiments developed typhoid within eight weeks of mobilisation. Out of 106 regiments, thirty-five, or 33·01 per cent., reached their camps with developed cases of typhoid fever. Eighteen regiments developed recognised typhoid fever within fourteen days of going into camp, and thirteen more within twenty-one days. If "probable" cases are included, that is to say cases classed as diarrhœa or malaria, no less than forty-one of these regiments reached their camps with actual cases of typhoid fever, and thirty more developed the disease within a fortnight. In other words, it may be fairly stated that the fever was *brought into* camp by the troops, and did not develop there. Typhoid fever is so widely disseminated in America, that the chances are that in a regiment

of 1300 men the fever will develop in camps which were sanitarily perfect. The disease is more apt to spread in camp because of the difficulties of dealing with the excreta in which the infection is contained, and a man with typhoid may scatter the infection in every latrine in the regiment before the existence of the disease is diagnosed.

"Camp pollution," says the report, "was the greatest sin committed by the troops in 1898." Much fæcal matter seems to have been deposited on the surface about the camps at Chickamanga. The ground, moreover, was often sodden with heavy rain, and the whole surface became polluted. It seems also that some camp sites were badly chosen, and were in some instances too long occupied. The usual complaint is made that line officers are not blameless. All the medical officers could do was to make recommendations, and the reporters suggest that they should receive greater powers. The disinfection of excreta and its carriage away from camps is recommended. Flies, as in South Africa, undoubtedly acted as disseminators of infection—and it also seems probable that the infection was carried on the clothing of the men. Man-to-man infection is strongly suggested by the occurrence of company epidemics. The question of carriage of infection by dust is also fully considered. In the encampment at Jacksonville the conditions were such that infection by this means was almost bound to occur.

The most important feature of the whole report is, we think, the emphasis it lays on the fact that an army or corps, badly infected, does not lose the infection by simply changing location. In moving, it carries with it the specific agent of the disease in the bodies of the men, in their clothing, bedding, and tent equipment. At Camp Meade careful and thorough disinfection of all fomites before moving to a new site was followed, apparently by gratifying results. The Commission makes certain recommendations regarding disinfection, and the necessity of not overcrowding the tents, while it considers that the soldier's bed should be raised from the ground. In many instances the men seemed to be sleeping in thick dust, which was probably infected by typhoid germs. A strong case is made out to prove that the cases of so-called malaria and diarrhœa were in reality typhoid fever, and the astonishing result is that no less than one-fifth of 107,973 officers and men are found to have had typhoid fever. The death-rate of these cases was between 7 and 8 per cent.

Registration of Nurses: Report of Select Committee.

THIS Committee, appointed in June of 1904, and reappointed last Session of Parliament, has now issued its report, the tenour of which will help to influence, and in some ways to modify, the

provisions of the Bill through which it is proposed to deal with this matter. The Committee find, from evidence given freely both by nurses and medical men, that there is a general desire for some change in the conditions under which nursing is carried on. The three new subjects for registration are to be, the body of nurses themselves, the schools from which they derive their instruction, and the homes and institutions in which or from which they work. With reference to the first of these, it would appear that the Committee is of the opinion given lately in these columns, that to enforce registration on all who nurse for gain is unworkable. "Your Committee are agreed that it is desirable that a Register of Nurses should be kept by a central body appointed by the State, and that, while it is not desirable to prohibit unregistered persons from nursing for gain, no person should be entitled to assume the designation of 'Registered Nurse' whose name is not upon the register." This is a wise provision; the village "handy woman," untrained in any school, yet not without a fair amount of mother wit and practical experience, is not to be ruled out of existence; but it will become necessary for the woman who professes to be a skilled nurse to undergo training, and place herself on the register, if she wishes to undertake generally and anywhere the duties of her calling.

The course of training is to become of consequence. The Committee do not offer any definite proposals regarding the details of this course, not even prescribing its length; they suggest three years as a suitable curriculum in the majority of cases, but prefer that this be dealt with more specifically by the central board of management. This board, by the way, is not to be of the large number contemplated by the framers of the Bill. These would have a board of twenty-one members, two-thirds of them women. The Committee, perhaps wisely, do not presume to determine the sex composition of the central body, but suggest that the number be kept "within reasonable limits"; eleven for choice, and not to exceed fifteen; these to consist of matrons, nurses, representatives of the medical profession, of the training schools, and of the public. No special mention is made of male nurses, and we think that a representative from the Services, either from the Royal Army Medical Corps or the Royal Nursing Reserve, might with propriety have been included. To this board, then, the Committee would entrust the difficult task of determining the scope and time of the necessary course of training. Such course having been determined, the nurses who had successfully undergone examination, on completion of the course, would, on payment of a fee, be admitted to the register. And here the question seems to have arisen, whether or not the register should be a general register or one of departments. For in one clause of the report the suggestion is made that a separate register of asylum nurses should be kept; also that after a time a separate

register be formed of nurses whose training is of a lower standard than that laid down for "Registered Nurses." The principle thus having been introduced of separate registration, there might be much to say in favour of its extension generally. Unless the central board are prepared to make the course of instruction wide enough to cover all forms of nursing in every individual case, this should be asked for in the interests of the public. Thus, supposing that a nurse has become registered in virtue of a course of training in a surgical hospital, is she then to become at will an obstetric nurse whenever she pleases? Should not the register indicate by some distinctive sign the branch or branches in which the nurse is qualified? But if so, why then have a separate register of asylum nurses? One general register of skilled nurses is all that is required in the public interest, if the work for which the nurse has specially qualified herself be clearly indicated. For the nurse "whose training is of a lower standard" we hope that no registration will be required. To make the ordinary village nurse pass through a course of study insufficient for registration proper, is not only to put a task on her which she is unable, as a rule, to fulfil, but to neutralise the benefit of having a register at all; for it would not be easy to convince the working-class public that one registered nurse was not just as good as another.

Of considerable importance are the suggestions for registration of nursing homes and institutions. The former include all places where patients are taken in for treatment; the latter the bodies supplying nurses to the public. With regard to the former, the due supervision of these will remove the only possible cause of offence that exists in the nursing world. There did exist, perhaps still exist, in London at least, certain "homes" of which the less said the better: one hint of inspection, and these disappear for ever. And, in the interest of the nurses, it would be well that the societies which supply nurses to the public be under some sort of public control. It does not appear quite equitable that a nurse earning two guineas a week for the institution should get a wage of thirty-five or forty pounds a year. In the so-called "co-operative" associations she appears to be somewhat better off; yet even in them the accommodation for nurses whilst "in the home" is not always everything that could be desired. A little wholesome public control might agreeably change all that.

The Society of Apothecaries of London.

COMPARATIVELY few readers ever devote a thought to the anxiety and research, the time and the trouble, entailed upon the writer of an historical work, contrasted with what is sufficient for the more imaginative literary productions of the day, or what are familiarly

classed as works of fiction. In the one case a certain but inexorable amount of investigation and responsibility is demanded; while in the other an unfettered fancy and a fertile imagination are left free to supply and constitute all the essentials more immediately required. There is nothing invidious in making such a statement, and the book before us[1] bears witness to its truth.

The story of the Apothecaries, as told by Mr. Barrett, markedly falls under the category of those publications where extensive and careful research is unavoidable. The narrative disclosed by him is authenticated by innumerable references to such sources of information as supply and throw a most interesting and instructive light upon many circumstances presented as occurring in the bygone days of the medical profession—days when its constitution was everywhere and altogether different from what it now presents. The separation of the general body of those practising the healing art into different branches may be said to have begun, or rather been initiated, only so late as the reign of Henry VIII., although the designation of "Apothecary" is met with long before that date. The appellation might perhaps admit of being freely interpreted as the keeper of a special store, and seems not to have been without its application in the circumstances. The Apothecaries were in 1617 incorporated as a distinct and separate body from the Grocers, with whom they had been previously associated, in much the same manner as the Surgeons had originally been connected with the Barbers. Ten years before that period they had been incorporated by James I. as a City Company united with the Grocers, but from whom, as has been said, they were in 1617 separated by the new charter, and styled the "Worshipful Society of Apothecaries of the City of London." After this, as shown by Mr. Barrett, a period not without its trials and vicissitudes appears to have awaited them. They had been invested with powers to inspect, and if of bad quality destroy, the medicines sold in the districts of London, Westminster, and Southwark. But, as unfortunately sometimes occurs in the earlier career of many young communities, they manifested subsequently to their new charter the tendency to a departure from the precise rights and privileges bestowed upon them. They now in certain instances began not only to prescribe for patients, but to act as general practitioners—squabbles and litigation arising as a natural consequence. Feuds and jealousies were at that time too easily excited among the older corporations not to have led to a watchful eye being kept upon the Apothecaries; and where a commercial spirit unmistakably mingled with what was ostensibly the higher objects of the Physicians and Surgeons, a policy of obstruction on their part was not, under the circumstances, to be wondered at. There seem to have been also, and about this time, certain minor troubles besetting

[1] "The History of the Society of Apothecaries of London," by C. R. B. Barrett, M.A. (Oxon.). London: Elliot Stock, 1905.

the Apothecaries; such as the matter of dinners, the question of barges, banners, and liveries for the Lord Mayor's show; and, above all, the necessity of securing a hall for the transaction of the Society's business. Sundry losses were in this manner, and on more than one occasion, sustained, and it was some time before the new Corporation held more than a subordinate place, or obtained the position it so well merited, among the other and older medical bodies.

Gradually, however, the Society, as is admirably shown in Mr. Barrett's volume, began to assert and to take its position as one of the National Medical Institutions of the United Kingdom. With growing prosperity, it has continued to advance, and under the auspices and with the assistance of the Acts of 1815 and 1868 it has occupied its place among our leading medical corporations. Long ago it had commenced giving lectures and conferring its licence on a fair number of students, and during the last century its qualification for medical practice has become recognised and sought for by candidates to an extent which has placed its Diploma on a level with any of the licensing bodies of Great Britain, its extended examinations being now accepted as complementing those for the various conjoint medical and surgical diplomas of the present day.

ORIGINAL COMMUNICATIONS.

THE TREATMENT OF FACIAL PALSY.[1]

By Barry Pain.

Before each case deliberately pause,
And delicately ascertain the cause.
Cherchez la femme—if she the ill decides,
Resort to mercury and iodides.
Or if the trouble's rooted in the ear,
Mayhap the surgeon's skill must interfere;
In any case, if there the cause is seated,
Otitis media must be promptly treated.
Next, if the nerve be cut, 'tis little wonder
That man must join what steel has put asunder;
Primary suture fitted to the act is—
Plain seccotine is most improper practice.

But far more common in these palsied faces
Are what are often styled rheumatic cases.
Here by the stylomastoid hole apply
The blister honoured with the prefix "fly."
("Hole" suits the metre best, but even laymen
Must be aware I should have said "foramen.")
Then clear the decks for action; stoutly urge
The skin to sweat, nor spare the homely purge;
But, lest such treatment cause another ill,
Use due precaution 'gainst insidious chill,
And if your patient should be racked with pain,
Antipyrin—a dose or more—10-grain.

Now must he daily for one quarter hour
Seek electricity's remedial pow'r.
Before the mirror he his posture takes,
Mild but not weak the continuous current makes,
And with one pole the lifeless muscles strokes,
Till by such means contractions he provokes,
Placing the positive, that other pole,
Above his shirt's posterior button-hole.
Be patient, patient; your reward you'll earn
When voluntary power 'gins return;

[1] It is to be understood that the writer makes no pretensions to any medical knowledge.—Ed. *E.M.J.*

Meantime let massage reign with gentle sway
O'er the affected muscles every day.
Thus, for six moons if need be, persevere;
The cure, or more or less, is mostly here.

But some there are that equally defy
The masseur's hand and electricity;
And such were hopeless once, but Time discloses
The charm at last of nerve-anastomosis.
(For sundry published cases you may see
The *B. M. J.* of date 2/5/03.)
Sever the facial nerve high up, and there
Join to the accessorius with care
Or to the hypoglossal; of the two
The latter is the better thing to do,
For the tongue-centre has less cause to shirk—
It takes no stranger's but a neighbour's work.
Thus shall the patient, if he wait a while,
Regain the power and the wish to smile.

Thus the misfiring motorist will stop,
And from his driving seat inquiring hop,
Open his car and all-attentive peer,
Examining and testing there and here;
Then by some different coupling of the wires
Attain the object that his heart desires;
The engine sweetly runs, nor any more misfires.

TRYPANOSOMIASIS IN THE ANGLO-EGYPTIAN SUDAN.

By ANDREW BALFOUR, M.D., B.Sc., M.R.C.P.Ed., D.P.H. (Camb.).
Director, Wellcome Research Laboratories, Gordon College, Khartoum.

(PLATE V.)

IN the *British Medical Journal* of 26th November 1904, I published a preliminary note on the above subject. This article referred to the fact that I had found trypanosomes in the blood of a donkey from the Bahr-el-Ghazal, that Head [1] had discovered similar parasites in mules from the same region, and that in smears from the blood of Shilluk cattle which he had submitted to me for examination I had found these flagellates. Since that paper appeared, a considerable amount of information has been obtained, and a good deal of research work has been

carried out in the laboratories, upon what is a very important subject in a country like the Sudan. The following are the chief points to which I wish to direct attention:—

1. The prevalence and distribution of trypanosomiasis in the Sudan.

2. The presence in cattle of a small trypanosome which Laveran has declared to be a new species, and which he has named *T. nanum.*

3. The question as to whether equines, or at least mules, are liable to a double infection by two different species of trypanosomes, or are the hosts of a *T. dimorphum* resembling that which affects horses in Senegambia.

4. The great frequency of hæmorrhagic ulcerative lesions of the stomach in trypanosomiasis and their significance, also the comparative frequency of intestinal ulceration.

5. The occasional presence of spirilla in these gastric lesions, both in the blood clot adherent to the ulcers and in the ulcerated surfaces.

6. The action of chrysoidine as a therapeutic agent in trypanosomiasis.

7. The therapeutic action in trypanosomiasis of the blood serum of wild animals (big game) whose habitat is in trypanosome-infected areas, a line of research suggested by Dr. Sheffield Neave (*vide infra*).

I. As regards Prevalence and Distribution.—There can be little doubt that in the Southern Sudan, that is to say, in the region south of the tenth parallel of latitude, trypanosomiasis exists to a very considerable extent. An illness known to be due to the bites of tsetse flies, and affecting donkeys, horses, mules, and possibly camels, has been recognised in the Bahr-el-Ghazal province since that distant region was visited after the reconquering of the Sudan. Expeditions have experienced siderable losses in transport animals from this cause. Again, and more recently, sick and emaciated animals have been coming from the Upper Sobat district, and especially from the neighbourhood of Itang, a station on the Baro River in Abyssinian territory.

Old records also speak of animals dying from fly bite on the upper reaches of the Blue Nile, but accounts are so vague, both as regards the nature of the illness and that of the fly said to cause it, that no definite conclusion can be reached regarding the prevalence of trypanosomiasis in that region. No cases have been sent me from the Blue Nile provinces, and I have not received samples of tsetse flies from these parts, nor seen them between Roseires and Wad Medani, where the river is more or less bordered by bush and forest. In the Northern Sudan, the region of sandy wastes, as pointed out in the preliminary note, trypanosomiasis has not been found to exist, but

no great number of examinations have been made, and investigations upon frogs, lizards, and a large number of birds have yet to be conducted. Dr. Sheffield Neave, travelling pathologist to the laboratories, has been working down Nile from Gondokoro, and has found trypanosomes in at last three species of Nile fish, in a lizard, in kites, and in vultures. These finds in birds are specially interesting in the light of Novy's and M'Neal's recent researches (2).

For the purpose of gathering information and material regarding the trypanosomiasis of Shilluk cattle, I accompanied Colonel Griffith, the principal veterinary officer, to Taufikia, near the mouth of the Sobat River, and 526 miles south of Khartoum. The journey was undertaken in January 1905, and at Melut, fifty miles north of Kodok (late Fashoda), a herd of Shilluk cattle was inspected. Three sick animals were picked out and examined. In the blood of one of these I found a trypanosome identical with the parasite found in Shilluk cattle at Khartoum which had come from the Kodok region.[1] Nothing was found in the blood of the other two animals, but it is probable they were suffering from the disease, as they presented the characteristic symptoms, *i.e.* extreme anæmia of the mucous membranes, weakness, emaciation, and some running from the nose. At Melut we received vague information as to the presence of a fly belt a considerable distance inland, and were told that the cattle became infected after the rainy season, *i.e.* in August. On these cattle, as in those at Khartoum, large numbers of the tick called *Amblyomma variegatum* were found, as well as flies of the genus *Hippobosca*. It may be said at once that examination of these insects has always proved negative, but, as will be shown, the trypanosomes are never very numerous in the blood of cattle.

A herd which had just been imported from the north showed no signs of disease.

At Kodok a small herd was seen, and one sick cow, which eight months previously had come from Melut, was examined. It was distinctly thin and anæmic, but no parasites were found in its blood.

At Taufikia, six separate herds of cattle were inspected, the bloods of twelve sick beasts were examined, and trypanosomes were found in one animal only—a cow from Abyssinia, which had recently aborted, and was in a dying condition.

This trypanosome proved to be *T. [illegible]*. Three sick mules, coming also from near Itang, were found to harbour trypanosomes. These were not the same species of parasite as those found in cattle, but appear to be identical with those discovered by Head in mules from the Bahr-el-Ghazal. A dog was inoculated from

[1] The recent discovery of *G. [illegible]* in Southern Kordofan probably explains the prevalence of tsetse disease in this district.

one of these mules and brought to Khartoum, where it developed trypanosomiasis. It was from this strain, carried on by successive passages through animals, that I have been able to study the parasites of the disease in mules. The cow from Melut was also brought to Khartoum, and will be again mentioned in due course. At Taufikia, a monkey (*Cercopithecus sabæus*), a bat, and a black and white crow were examined, with negative results.

Out of three sparrow-like birds examined, two showed halteridia in the blood.

It is difficult to base any conclusions on such limited observations. The trypanosomiasis of cattle is a chronic disease to all appearance, and it will be some time before its prevalence is correctly gauged. In equines the malady appears to be common in the Bahr-el-Ghazal, where *G. morsitans* is found, and probably exists to a considerable extent on the Upper Sobat. On the mules at Taufikia large numbers of a species of *Stomoxys* were found, biting fiercely, specially in the evenings. No opportunity of properly examining these flies was afforded. In one, which was dissected, no trypanosomes were found, but several hours had elapsed before its stomach contents were examined. One may here refer to human trypanosomiasis which so far has not been encountered within the confines of the Sudan, though, as previously noticed, Dr. Neave ([3]) found Leishman-Donovan bodies in the spleen of a boy coming from Meshra, in the Bahr-el-Ghazal. At Taufikia I found that a Sudanese battalion was being recruited to some extent from Uganda, and discovered that twelve men had come from Kampala, close to Entebbe, a centre of the disease. Some of these men exhibited enlarged cervical glands. They were tested by blood examinations, gland puncture, and, in one specially suspicious case, inoculation into a monkey (*Cercopithecus*), but with wholly negative results. Later they were sent for observation to Khartoum, and were re-examined, but no trypanosomes were found. The presence of these men at Taufikia, however, served to draw attention to what was undoubtedly a source of danger. Recruiting from Uganda has now been abolished.

Captain Greig ([4]) has shown that the country immediately south of Gondokoro is not of the kind likely to harbour *G. palpalis*, and neither Dr. Neave nor I saw anything of tsetse flies on the upper White Nile. As *G. morsitans* haunts the forest districts of the Bahr-el-Ghazal, there is nothing to prevent *G. palpalis* being likewise an inhabitant, and Dr. Neave's trip through that region may serve to settle this important question.[1]

II. The Disease in Cattle.—Cattle trypanosomiasis has been

[1] Dr. Neave did not find *G. palpalis*, but it has been reported as existing at Wandi in the Lado Enclave, and at Mvolo in the Bahr-el-Ghazal. The report requires confirmation. I have recently heard that Major Bray, of the Egyptian Medical Service, has sent to Khartoum a specimen of a fly taken near Mvolo. It is believed to be *G. palpalis* by Captain Ensor, who examined it, and is my informant.

studied in Khartoum, Melut, and Taufikia. The disease appears to be of a chronic nature, the principal symptoms being extreme anæmia, especially visible in the blanched, glistening, conjunctival surface; weakness, emaciation, running from the nose, and occasionally, dribbling of urine. The last condition is probably dependent on muscular weakness. Plate V. Fig. 1 gives a good idea of an animal suffering from the disease. Notice the dull, listless, half-closed, and sleepy eye, the prominent ribs and Lip bones, and, what is rather constant, the atrophic line in the shoulder hump. In the later stages the head is held low, and towards the end there is complete collapse, the animal lying down and refusing to rise, the skin cold, the coat roughened, urine and fæces passed involuntarily, and the respirations noisy and rapid. At this stage the animal may take food, and indeed failure of appetite does not at any time seem to be a symptom. Careful examination failed to detect enlarged glands towards the root of the neck, but one is apt to be deceived by feeling the subcutaneous, gelatinous exudation which is found to exist post-mortem. The first ox from which specimens were obtained died some fifteen miles from Khartoum. Smears of the peripheral blood, liver, and spleen were submitted to me by Captain Head. In all of these I found the small trypanosome, since named *T. nanum* by Professor Laveran. Captain Head also brought in some of the cerebro-spinal fluid, which was centrifuged, and in the sediment streptococci, possibly due to contamination, and altered and amœboid forms of the parasite, were found. The latter resembled those described by Plimmer and Bradford (5) in bone-marrow in cases of nagana, and by Castellani (6) as occurring in the cerebro-spinal fluid in sleeping sickness. They were few in number and stained feebly. A somewhat pear-shaped, flagellated form was the most striking.

The second ox also died at a distance. In smears made from its blood trypanosomes were fairly numerous The stomach, which had been placed in spirit, was the only organ brought to the laboratories. Attached to it was a small piece of omentum. On opening the stomach, a very curious condition of pigmented ulceration was disclosed, affecting the mucous membrane (Plate V. Fig. 2). Scattered about were dark areas with thickened edges raised above the surrounding mucous membrane. The surfaces of these areas were flat and slightly depressed, and consisted of what was afterwards found to be altered blood clot. No smears were made from these areas, but sections were cut and examined. Beyond a severe bacillary invasion and the appearance of considerable erosion and destruction of the mucous membrane, nothing was found.

The following are my notes on the condition :—

"EXAMINATION OF ABOMASUM OR FOURTH STOMACH.—*Cardiac end.*

—Nothing noticeable externally. In a small piece of attached omentum there are two enlarged glands about the size of peas, rounded, elastic to the touch, purple in colour externally, and deep purple on section. The mucous membrane is of a uniform dark slate colour, no ecchymoses are present, but there are some dark patches, possibly due to post-mortem changes. Studded over the surface of the mucous membrane are spots of intensely black pigment (Plate V. Fig. 2). Each of these, in most instances, seems to surround a tiny punched-out hole, and the pigmentation is most marked in the central depression. A few black granules can, as a rule, be squeezed out from the central pits. These granules were found to consist of altered blood. Where the patches are more advanced, they present the appearance of ulcerations. Most of these are more or less circular and depressed, but some are in the form of ulcerated streaks, and all are intensely black. In addition there are a few patches of superficial pigmentation in which there is no ulcerative process.

Central portion.—The condition is very similar, but the patches are larger, some of the ulcerated "streaks" being $\frac{3}{4}$ in. in length. In one or two places the ulcerations appear to have healed, leaving depressed and whitish scars surrounded by areas of slight pigmentation.

Pyloric end.—Nothing noted externally. The mucous membrane shows a general pigmentation of the surface in the form of little circular shallow pits with pigmented walls, the pigmentation being very slight. In addition, pigmented ulcers, similar to those previously described, are present in considerable numbers, and in some instances a regular plug of the black material fills up the ulcer and rises above the surface of the mucous membrane. There are also present the superficial pigmentations already mentioned, some of which are associated with slight erosion. Where ulcers are marked, their edges are thickened. The ulcerative process and the pigmentation are confined to the mucous layer. In no instance does perforation seem to have occurred. Size of largest ulcer, $\frac{3}{4}$ in. by $\frac{1}{4}$ in."

At the time I did not think that these ulcerations, which rather recalled the lesions produced by the swallowing of a corrosive poison, were in any way connected with the trypanosomiasis. Since then I have had reason to alter that opinion, as will be seen when we consider the experimental work with the trypanosomes of mules. Captain Greig, whom I met on his way to England from Uganda, informed me that he had recently found a similar condition of ulceration in the stomachs of natives dead of sleeping sickness.

The third ox is that shown (Plate V. Fig. 1). The blood was taken at Khartoum on 30th October, and as many as two trypanosomes were found in some fields. The animal was kept and well fed. On 4th November fresh and stained blood films were examined, but no parasites could be demonstrated. Thereafter, though the blood was centrifuged and examined, and though the animal was subjected to four days' partial starvation, trypanosomes were not again found. Eventually, as the owner wished to slaughter the ox, it was exchanged for ox No. 4, which was

examined on 23rd November, when a considerable number of trypanosomes were found, as many as six per cover-glass preparation being present. This ox continued to show the parasites in its blood, and gradually became thinner and weaker.

On 3rd December it was found to be very weak with marked anæmia and dribbling urine. The urine and fæces were examined for blood, but none was present. The fæces were slightly tarry in consistence, and this and their colour suggested the examination.

On 4th December the ox was found to be *in extremis*. Trypanosomes were slightly more numerous in the blood, and as it was feared the animal might die during the night, it was slaughtered, and an autopsy performed immediately.

The principal points noted were :—

(*a*) The extensive subcutaneous, gelatinous, and pale yellow exudation. Nearly every part of the subcutaneous connective tissue was in an œdematous, watery condition, which was most marked where the skin was loose, *i.e.* in the dewlap, behind the shoulders, and in front of the haunch.

(*b*) The presence of enlarged purple hæmorrhagic glands about the root of the neck.

(*c*) The great and general enlargement of the mesenteric glands, which were also, though to a less extent, hæmorrhagic in nature.

(*d*) The presence of a certain amount of chronic meningitis affecting the pia arachnoid, the pia being somewhat adherent to the surface of the convolutions. There was little thickening of the membranes, and no appearance of encephalitis. Indeed, the brain appeared markedly anæmic. The stomach, which was distended with food, presented no ulcerative condition, but contained "bots" of a different kind to any I have seen in the Sudan. The intestinal tract was normal. There was nothing special to note with regard to the spleen and liver, which were neither congested nor enlarged. The heart's blood showed trypanosomes. Fluid from the lateral ventricles of the brain and from the cerebro-spinal fluid showed nothing in the way of trypanosome infection. Bile taken with aseptic precautions from the gall bladder contained a short stout bacillus in considerable numbers, but no flagellated parasites.

The cow at Melut was picked out by the natives as being ill. The blood was collected in tubes containing citrate of soda solution. Such blood showed trypanosomes, though these were only found after some searching.

The Abyssinian cow which aborted at Taufikia, and was in a dying condition, also had trypanosomes in its blood, but they were not at all numerous. Time did not admit of a post-mortem examination in this case.

The trypanosome concerned is a small one. It is not very active in fresh films, and I have never seen one traverse the whole

field of the microscope. The motion is undulating, combined with a vigorous lashing to and fro of the anterior part of the body, which tapers to a very tiny flagellum. Rippling, and what may be termed spreading, movements have also been observed. The parasite advances usually with the narrow end in front, but this motion is often reversed, and I have seen one move a considerable distance, pushing aside the erythrocytes with its blunt posterior end. A fact which is very noticeable is that the trypanosome tends to adhere to the red blood corpuscles. Even in a thin field this is seen, the parasite seeming to take a delight in butting and boring at the erythrocytes. Frequently it gets beneath them and is lost to view, the agitation it produces being the only clue to its presence. Having studied this trypanosome, both in the living and stained condition, and having conducted a few inoculation experiments on laboratory animals (*vide infra*), I became convinced that this was either a new and undescribed trypanosome, or was identical with the parasite of cattle found by Bruce, Nabarro, and Greig on the shores of the Victoria Nyanza in Uganda. Stained specimens were sent to the Liverpool School of Tropical Medicine, but I learn that unfortunately the stain had faded and could not be repeated with success. In the meantime I had sent unstained films to Professor Laveran (7), to whom I am much indebted for his kindly interest, and who, in the Proceedings of the Biological Society of Paris of 24th February, describes the stained trypanosome, which he regards, provided further experiments prove it to be peculiar to cattle,[1] as a new species, and which, on account of its small size, he has named *T. nanum*.[2]

His interesting description of these parasites is as follows:—

"The trypanosomes measure 10 to 14 μ in length, by $\frac{1}{2}$ to 2 μ in breadth. Their structure is that of the flagellates of the genus trypanosoma, although, contrary to the rule, the protoplasm is prolonged on the anterior part in such a way that there is no free part of the flagellum, or the free part of the flagellum is extremely short. The undulating membrane is very straight, and in consequence but little apparent. The posterior extremity is conical, not drawn out, and in other respects varies somewhat. The oval nucleus is situated near the centre of the body of the parasite. The rounded centrosome, rather large, occupies a position close to the posterior extremity. The protoplasm is homogeneous without granules.

"Some forms a little longer than the others show two centrosomes and a flagellum, divided to a greater or less extent, proceeding from the centrosomic insertion."

He proceeds to point out how different in morphology is this trypanosome from *T. Brucei* and *T. Evansi*. He compares it with *T. Theileri*, the giant trypanosome of South African cattle, and

[1] I have since found a very similar parasite in the blood of mules.
[2] *I.e.* the "dwarf" trypanosome.

concludes by remarking that while very distinct from *T. Theileri*, *T. nanum* approaches it in being peculiar to cattle, so far as is at present known.

I have little to add to the above description.

The photo-micrograph (Plate V. Fig. 3), for which I am indebted to Dr. Beam, chemist to the Laboratories, gives a very fair idea of *T. nanum*. It shows it to be a short trypanosome with hardly any free flagellum visible, but is not quite typical in that the posterior moiety is rather broader than is usually seen.

I append measurements I have made of a form whose total length was 14 μ.

From posterior end of body to centre of centrosome .	1·2 μ
From centre of centrosome to nucleus	4·2 μ
Nucleus	1·6 μ
From nucleus to beginning of flagellum . . .	5·6 μ
Free flagellum	1·4 μ
Breadth behind nucleus	2 μ

I agree that the protoplasm is homogeneous, though it sometimes stains irregularly, as evidenced (Plate V. Fig. 3), while in forms kept *in vitro* granules appear, for the most part anterior to the nucleus. In such forms the vacuole in the neighbourhood of the centrosome may be found large and very evident. Sometimes a portion of the free edge of the undulating membrane is clearly visible, bunched as it were upon the back of the trypanosome and looking like a loop. As a rule, however, the undulating membrane can scarcely be seen save in the living parasite. I have worked with specimens stained by the Leishman-Romanowsky method, which answers admirably if the stain be strong and staining prolonged.[1]

I have carried out a few experiments *in vitro* which may be mentioned here, though the study of the trypanosome is yet far from complete, owing to lack of material and press of other work. Hence cultivation experiments have not yet been attempted.

In citrated blood kept at a temperature of 22° to 23° C., no change in the trypanosomes was visible after twenty-four hours. They remained lively and stained well. After seventy-two hours at a temperature of 25° C., changes were observed to have occurred, the posterior ends of the parasites having become swollen, while the organisms were sluggish and evidently degenerating.

Trypanosomes disappeared in twenty-four hours from sterile citrated blood which had been exposed to a temperature of 16° C.

The trypanosomes from the Melut cow remained alive in non-sterile citrated blood at a temperature of about 35° C. for twenty-four hours. They underwent longitudinal division, forms with two centrosomes and two nuclei being seen. In these the undulating membrane was more apparent than usual.

[1] Equal parts of the fluid stain and distilled water allowed to act for twenty minutes or even longer.

INOCULATION EXPERIMENTS.—*From ox No.* 1.—0·5 c.c. citrated blood, *i.e.* about 0·25 c.c. blood, was inoculated subcutaneously into a monkey (*Cercopithecus sabæus*) on 30th October 1904.

On the same date a *rabbit* received 1 c.c. of citrated blood. These animals never showed any symptoms of the disease, and though their bloods were repeatedly centrifuged in the hæmatocrit tubes, and carefully examined both in the fresh and stained condition, no trypanosomes were found.

From ox No. 4.—On 23rd November a *rabbit* received 2 c.c. of blood containing a considerable number of trypanosomes, six to the microscopic field (employing Leitz, obj. 6, oc. 4, without ocular diaphragm), and a monkey (*Cercopithecus*) received 1 c.c. The result in the case of these animals was also negative, though they remained under observation for two months.

On 4th December a *brown pariah dog* received 2·5 c.c. of fresh blood subcutaneously at a time when trypanosomes were fairly numerous.

A *black pariah dog* received as food large pieces of the liver and spleen and several of the enlarged glands, all soft food be it noted.

These experiments also proved absolutely negative.

On 29th December the last-mentioned rabbit happened to be killed accidentally. A post-mortem was performed immediately, but no trypanosomes were found in the blood or in any of the organs. It would appear, then, that dogs, rabbits, and monkeys (*Cercopithecus*) are not liable to infection with *T. nanum*. As it was desired to institute further experiments, the cow from Melut was brought to Khartoum, arriving there on 4th March 1905, along with her calf. The blood of both animals was examined, but no trypanosomes were present.

In the case of the cow, this fact, taken in conjunction with what was found in ox 3, seems to prove that the parasites are in the habit of disappearing from the peripheral blood. Possibly spontaneous cure may occur.

The cow was in very poor condition, and presented all the symptoms of the disease, but repeated centrifuging of considerable quantities of blood failed to reveal the parasite. The animal has been under observation for nearly a month, and trypanosomes have never been demonstrated. Later examinations made down to the end of June all proved negative, and the animal, being well fed, steadily improved in health and appearance. On 7th March 1905, 4 c.c. of the cow's fresh blood was inoculated subcutaneously into her calf. At the time of writing, 27th March 1905, trypanosomes have not been found in the blood of the latter. Nor were they discovered up to the time of the last examination in June. The fact that, as a rule, there are not many parasites in the blood of cattle makes the investigation of *T. nanum* rather a tedious matter, and explains to some extent the imperfections of the research which has so far been conducted.[1]

REFERENCES.

1. HEAD, *Journ. Comp. Path. and Therap.*, Edin. and London, 1904, Sept. 30. 2. *Journ. Infect. Dis.*, Chicago, 1905, March.

[1] The other points mentioned at the beginning of this paper will be found discussed in an article sent for publication in the *Journal of Pathology and Bacteriology*, and which will probably appear in December.

3. *Brit. Med. Journ.*, London, 1904, May 28. 4. *Lancet*, London, 1905, Feb. 25. 5. *Brit. Med. Journ.*, London, 1903, June 20. 6. *Veterinarian*, London, vol. lxxii. p. 648. 7. *Compt. rend. Soc. de biol.*, Paris, 1905, Feb. 24.

DESCRIPTION OF PLATE V.

FIG. 1.—Shilluk ox suffering from trypanosomiasis of cattle.

FIG. 2.—Portion of fourth stomach of ox dead of cattle trypanosomiasis, showing the hæmorrhagic ulceration of the mucous membrane.

FIG. 3.—*T. [illegible]* (×1250 diam.).

SOME REMARKS ON POST-ANÆSTHETIC SICKNESS: ITS CAUSE AND TREATMENT.[1]

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IT is customary to regard any surgical intervention as a very trying ordeal for the subject of it. Moreover, those who have never been through the experience are wont to think of the operation itself as the really trying part, and only when it is over does the patient realise that there was nothing actually in that which, as far as he was aware, was awe-inspiring, dreadful, or even distasteful.

The first thing which really tries the patient is the absence of the morning meal, which is often "sadly missed," making him aware of a disagreeable sinking sensation, not to say an "aching void"!

If he wakes early the patient may experience some amount of restlessness and misgiving until the arrival of the surgeon and his myrmidons: but due preparation having been made—a step from the bed to the operating table, a hurried glance around the room (in which any trays of instruments have been discretely covered up), a few breaths of a not unpleasant vapour, and in a moment all is blank, and, in the words of a great surgeon, "the anxious brain and throbbing personality are plunged into an outer and uncertain darkness." Unless the anæsthesia be grossly imperfect, the patient sees and knows nothing of the operation itself, and with the natural assumption that the surgical procedure is carried out *secundum artem*, we will now pass to the stage of recovery from the anæsthetic.

The patient gradually becomes aware of a slow and painful sense of waking up after what appears to be years of slumber, unaccompanied by any particular feeling of relief at being once

[1] Read before the Edinburgh Medico-Chirurgical Society, July 5, 1905.

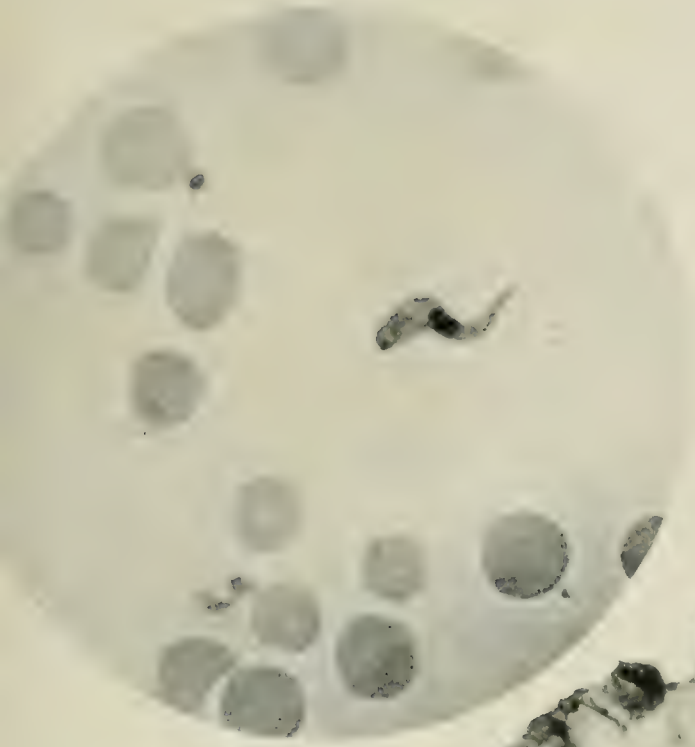

Fig. 3.

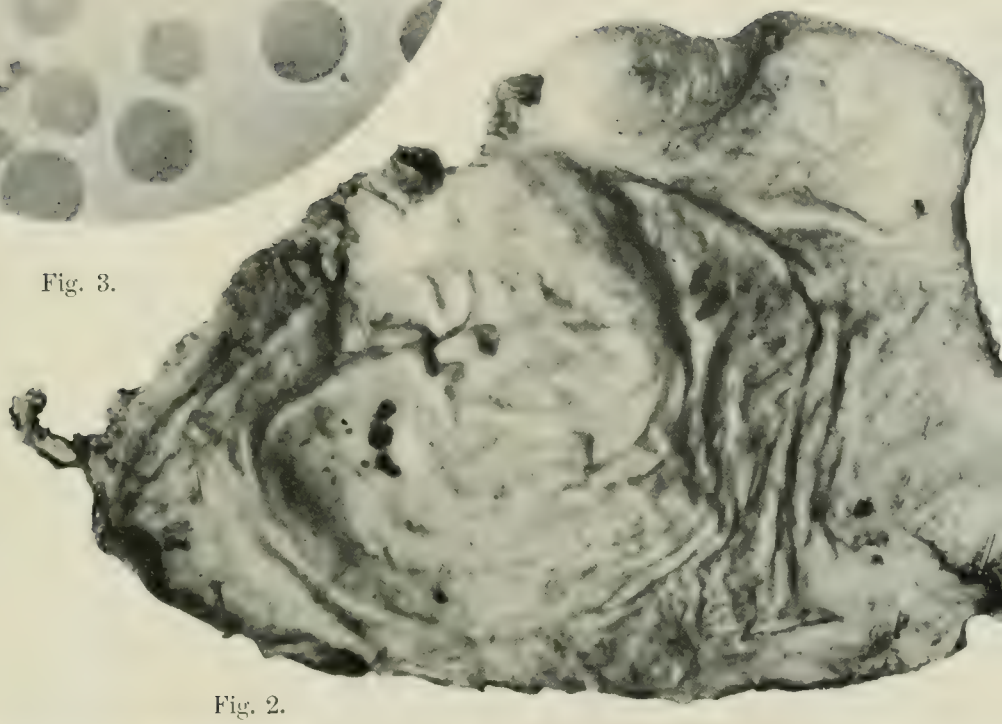

Fig. 2.

more alive, but rather labouring under a sense of injury at being born again into "a sea of trouble." He is aware of a sensation of having seared flesh in some portion of his anatomy, and gradually becomes conscious of the fact that a being, often somewhat stern withal, in the shape of a nurse, is beside him bidding him "Lie still," "Keep your legs down," or, worse, "Spit it out into the basin"! and worst, worst of all, a sense of deadly nausea culminating in agonising retching very inadequately likened to one's sensations when making the Calais-Dover passage in a "cross sea." The feeling of misery and absolute prostration will be the more appreciated as the patient regains complete consciousness, and we know that these trying symptoms are experienced in some cases for three or four days after the operation, distressing the patient, and retarding his progress, worrying the nurse, annoying the surgeon, in some cases defying all treatment, and even ending fatally. Apart from such a disaster, there are the weary weeks of enforced quietude to be got through, and the sense of utter and complete helplessness during a portion of this time; but on these I need not enlarge, and will pass at once to some details as to the causation of anæsthetic sickness, and later to its treatment.

Among the factors influencing the occurrence of sickness after the inhalation of an anæsthetic, the following are the most important:—(1) The nature of the anæsthetic employed. (2) The nature of the operation, with special regard to its duration. (3) The degree of skill with which the anæsthetic is given. (4) The thoroughness with which the patient is prepared and fasted, and the after-treatment employed. (5) The patient's condition at the time of the operation, with special regard to his digestion and alimentary tract. (6) Lastly, the patient's age, sex, and temperament, while even climatic influences are to be reckoned with to some extent.

1. The Nature of the Anæsthetic.—There can be no manner of doubt that the actual anæsthetic employed in any individual case has a most important relation to the character and degree of the sickness which occurs subsequent to an operation, and this question has been very carefully investigated in a very large number of cases. Such observations, indeed, are of little use unless they have extended over many cases, and opinions offered in individual instances by those in attendance as to a patient being more or less sick because they were given this or that anæsthetic must be accepted with all reserve, not to say scepticism.

The most important available material on this question is that afforded by the "Report of the Anæsthetic Committee of the British Medical Association," issued in 1901, with an analysis of 21,585 cases. Of these, 3406 were troubled with vomiting in varying degrees, and the remainder were free of any such trouble.

The proportion of the cases, as regards the different anæsthetics employed, was as follows:—

Anæsthetic.	Total Cases.	No. of Cases of Sickness.	Per Cent.
Chloroform	13,393	1555	11·6
Ether	4,595	1135	24·7
N_2O and ether	2,071	311	15·01
A.C.E.	678	125	18·4
C.E.	418	49	11·7
C.-E.	59	17	28·8

Mr. Bellamy Gardner, with an experience of over 12,000 cases of anæsthesia, finds there is less sickness after "gas and ether" than after ether given alone, and attributes this to the smaller amount of mucus and saliva swallowed when the period of induction is brief, as with gas and ether.

About twenty years ago, Dr. Marcus Gunn, of Moorfields Hospital, investigated 4055 cases of ophthalmic operations, as regards the occurrence of vomiting after the anæsthetic.[1]

He found that 1902 of these vomited in varying degree:

		Sick.	Per Cent.
Of those given chloroform .	320	128	19
,, ,, ether . .	1072	574	53
,, ,, E. and C. . .	2306	1089	47
,, ,, A.C.E. . .	56	17	29

Combining these figures and putting our results briefly, we find after chloroform about 15 per cent. of patients suffer from vomiting; after A.C.E. or a mixture of ether and chloroform, 25 per cent.; and after ether, 40 per cent., are similarly afflicted.

Now, this is a very striking example of the fallacy of figures, which a little practical experience makes apparent. For, in the preparation of these statistics, it is evident that every case in which the patient even retched once, or brought up a little mucus, is included. To arrive at a proper estimate of the relative amount of sickness it is necessary that we consider in some detail the actual character of the sickness which occurs after ether and chloroform respectively.

The sickness caused by the inhalation of ether is of a very characteristic nature. It occurs almost immediately on the withdrawal of the anæsthetic, is violent while it lasts, but brief in duration, often ceasing before the patient regains consciousness. If we look to the exact cause of its occurrence, we can readily understand why this is so. In the vast majority of cases the vomiting is due to greater or less quantities of mucus and saliva impregnated with ether being swallowed during the course of the

[1] *Brit. Med. Journ.*, London, 1883, vol. ii. p. 651.

anæsthesia. While full anæsthesia is maintained, these lie in the stomach undisturbed, owing to the vomiting reflex being abolished, but as soon as the anæsthesia lightens, the stomach regains its power of asserting itself, and, sharply contracting, soon expels the irritating compound. Whether the vomiting is shorter or longer in duration, depends partly on the amount of mucus, etc., which has been swallowed, but more particularly on the viscidity of the mucus itself. For, if the mucus be viscid though small in quantity, it is slowly expelled, and retching and discomfort may be kept up for some time. In view of this, with the idea of hastening the clearing of the stomach and restoration of comfort to the patient, it has been suggested that a good large drink of water should be given the patient immediately before anæsthesia is induced, so that the ether and mucus subsequently swallowed may be diluted, and, in short, the stomach be washed out after a fashion.

It is with the same motive, of course, that we give patients large drinks of hot or warm water during anæsthetic sickness.

Both Clover, and Dr. Juillard of Geneva, who had given much attention to the subject under our consideration, found sickness after ether to be much less frequent than after chloroform, Clover putting it at 14 per cent. and Juillard at 9 per cent. (having analysed 3654 cases). They evidently considered the very brief cases of retching during unconsciousness to be negligible, and only counted cases which vomited after the full return of consciousness.

The sickness which occurs after the administration of chloroform, however, is of a different type.

The presence of a small amount of chloroform in the human stomach is not, as a rule, irritating, for, as is well known, this drug is administered in drops on a lump of sugar or in plain water as a comforting carminative, although it may later act as an irritant. But chloroform sickness, at any rate the bad type of sickness, is not produced so simply as by direct irritant action of the drug on the gastric mucous membrane, as we find to be the case with ether, and is much less easily got rid of.

It is the chloroform which is absorbed into the circulation by way of the lungs which actually leads to the trouble; chloroform which remains stagnant, so to speak, in the cells throughout the body, and is only eliminated with difficulty. This chloroform has a markedly inhibitory effect on the general metabolic processes, while the liver metabolism and glycogenic function are greatly disturbed, along with those of the pancreas, in many cases where the remote toxic action of the drug does not go so far as to cause gross cellular degeneration. The patient's pulse is slowed by both these effects, and the excretion of the chloroform and suboxidised products of digestion, by means of skin and kidneys, are checked. Is it therefore any wonder that we get cases of vomiting lasting for three or four days, accompanied with violent headache and great depression of spirits?

The most noteworthy difference in the character of ether and chloroform sickness is the time of onset. As I have already described, a patient who has been etherised, if he vomits, usually does so immediately the anæsthesia is lightened at the conclusion of the operation, very often when being lifted off the table on to the lorry or bed. The typical ether sickness begins early and ends early, frequently before the patient has regained consciousness; in fact, before he has time to become aware of his misery.

With chloroform the case is often very different. In the milder cases we may get retching and vomiting almost immediately after the operation is concluded, but much more commonly the onset is late, being delayed sometimes as long as twenty-four hours. This is a serious drawback in all operations, but especially in those involving the viscera. The average patient is prepared to put up with a good deal of discomfort on the actual day of the operation, but on the day following he not unnaturally expects to feel a little more comfortable and cheerful. What, then, are his feelings when the deadly nausea of chloroform sickness creeps over him, and any "slops" which he may be allowed in the way of food are promptly rejected when they reach the stomach?

Further, on the first day some spasmodic movements of the abdominal muscles in the region of the wound is not of much moment, for no special attempt towards union has been made beyond the outpouring of a little plastic lymph. But on the second and third days, when capillaries are stretching out buds, and branches of union are being formed, the intermittent spasm of the abdominal muscles caused by retching inevitably interrupts and delays union. In cases, therefore, where the patient would just be able to survive the strain and shock of the operation, were there no further tax on his strength, or depressing influence at work, the continuance of the anæsthetic sickness must, in many cases, determine the balance against him.

With regard to this question of the relative severity of sickness after ether and chloroform, etc., I have obtained the opinion of one or two leading experts.

Dr. Frederick Silk, of King's College Hospital, London, says, in reply to my query: "My own opinion is that ether is followed by sickness more violent in character than that which we find after chloroform, but it is almost immediate in onset, and is often not recollected by the patient, who, on recovery, may be quite unaware of the misery which he has apparently been through. The sickness after chloroform may or may not be as intense as after ether, but its onset is later, as it usually commences when the patient has fully regained consciousness. With *mixtures*, the type of sickness is more that of chloroform than that of ether, but with any or all of them much depends on the type administration, its duration, and several other factors." Dr. Silk says further: "The

longer I work the more disposed I am to use mixtures frequently —more frequently than I used to do. I now employ a mixture of one part of chloroform to two parts of ether, that is practically A.C.E. mixture *without the alcohol*, and I like it best of all. I am glad to think that other of my confrères are working on the same lines, and I certainly do not think that the analogy of "*mixed drinks*" has any bearing on the question. I have never limited myself to the advocacy of any one drug or combination, and feel I can speak without prejudice therefore."

Dr. Freeman, of the General Infirmary, Bristol, says: "My experience is that vomiting is not increased by using mixtures or sequences, but rather the reverse."

Dr. Lamb, Anæsthetist to the Victoria Infirmary, Glasgow, told me about two years ago that the longer he used A.C.E. and C.E. mixtures the more favourably was he disposed to think of them, and at that time he had had an experience of about 5000 cases. His colleague, Dr. Home Henderson, was working on the same lines as himself, and although at that time I was using chloroform alone or ether preceded by nitrous oxide, I was induced to modify my practice somewhat by Dr. Lamb's remark, and I must say I have been greatly impressed with the value of these mixtures in certain cases which one meets with almost daily, where either ether or chloroform, given alone, does not yield good results.

As regards nitrous oxide, given alone, the amount of sickness which occurs is practically a negligible quantity, if very simple precaution be taken, namely, not to administer gas within two hours of a meal. Over a series of hundreds of cases I have not found 2 per cent. to vomit.

As regards ethyl chloride, given alone, sickness occurs fairly commonly in about 20 per cent. of cases. This is the proportion which I found to occur in my own practice, and on consultation with Mr. Guy I find he gets much the same results, naming the figures 15 to 20 per cent.

After-sickness is considerably less common, however, if nitrous oxide be combined with the ethyl chloride, and the proportion does not then exceed 5 per cent. to 10 per cent.

I find that patients who are anæsthetised by means of the "ethyl chloride-ether sequence" are not troubled with after-sickness to a greater extent than when the gas and other sequence is employed, and Mr. Bellamy Gardner confirms this.

The question may be asked, "Granting that after-sickness is not aggravated by the use of mixtures and sequences—wherein lies the advantage of using them in preference to chloroform or ether by themselves?"

The reply would be somewhat a divergence from the subject of the present paper, but at the risk of being considered discursive I will deal with it briefly. In the February number of the *Edinburgh Medical Journal*, 1905, my late colleague, Dr. Daniell, dealt

at great length with the advantage of these mixtures and sequences, and set forth the facts of the case very forcibly.

In brief, the advantages are as follows:—(1) The saving of time in the induction of anæsthesia which is of special importance in hospital practice. (2) The avoidance of the dangerous stage of half anæsthesia, or the struggling stage when fatalities usually occur. (3) The better results which we obtain when we take each case which comes before us on its merits and choose the appropriate anæsthetic or combination. That better results are obtained any one with an extensive practical experience will readily testify, while statistics collated by reliable and unprejudiced persons will bear out their testimony.

It seems to me that in dealing with any case which comes into our hands *we are bound to employ the safest anæsthetic which circumstances permit*, especially in view of the large increase in mortality under anæsthetics in recent years, which increase is graphically demonstrated by the diagram (Fig. 1).

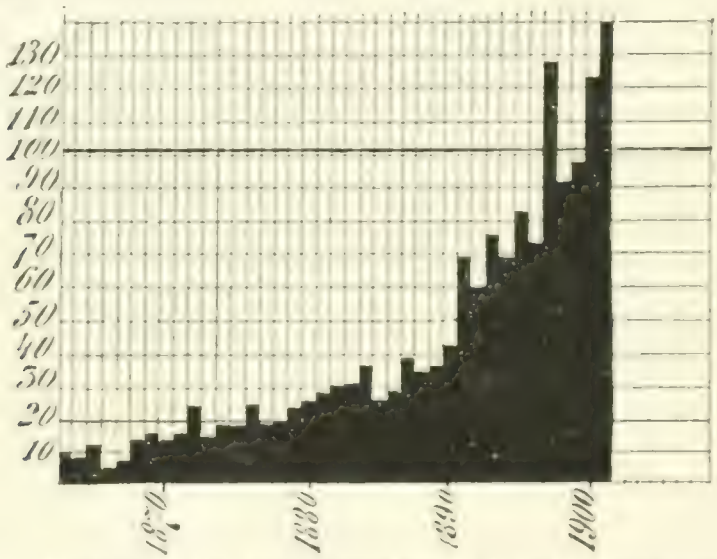

FIG. 1.—Diagram of the annual numbers of "deaths from anæsthetics" in England in the years 1863 to 1901, constructed from the returns of the Registrar-General.

2. THE NATURE OF THE OPERATION, ETC.—This factor has undoubtedly a very considerable influence on the occurrence of post-operative sickness, and it is especially in the domain of abdominal surgery that we find this to be the case. I have repeatedly noticed in cases of *appendicitis* that the sickness after the operation was particularly severe, especially in chronic relapsing cases where the patient had been ill or "seedy" for some months, with deranged digestive organs.

Purifying the alimentary tract in such cases does not mean that sickness will be prevented. Indeed, the collapse and depression following the liberal exhibition of this drug will in many cases aggravate the tendency to emesis.

In cases of strangulated hernia and *intestinal obstruction*, where vomiting has been going on for some time, and has even been fæcal in character, it does not in many cases cease at once after the operation has been concluded, although the actual cause of obstruction has been removed. As regards operations on the stomach itself, such as gastro-enterostomy, *excision of ulcer*, and *pyloroplasty*, sickness is not, as a rule, exceptionally severe, but in certain cases of gastro-enterostomy where the "circulus vitiosus" has been set up, profuse and continuous vomiting is sometimes seen to occur, ending in exhaustion and collapse of the patient in some cases. This condition may give a great deal of anxiety to the surgeon, but washing out the stomach repeatedly usually affords relief to the patient.

It need hardly be said that the nature of the anæsthetic employed in such cases has little or nothing to do with the character or duration of the vomiting.

When a laparotomy is performed for purposes of exploration in the presence of general peritonitis, post-operative sickness is rather the rule than the exception, and would occur in all probability if no anæsthetic at all were administered. A case of this nature came under my notice quite recently. The patient had undergone a laparotomy about ten days previously, and suddenly showed symptoms of intestinal obstruction and general peritonitis. There was constant retching and vomiting, the vomitus being dark green or black.

A laparotomy was performed for the second time, and some general peritonitis found, great difficulty being experienced in keeping the patient from vomiting during the operation. Sickness began again at once when the patient came out of the anæsthetic, and continued just as before the operation for three days, when matters suddenly improved and the patient recovered.

Nephropexy, or fixation of a floating kidney, is an operation often followed by prolonged nausea and vomiting. Patients who are operated on for tuberculous glands in the neck often give much trouble in this respect, both during and after the operation.

Gynæcological operations. — In 1863, Lister stated that the operation of oöphorectomy is frequently followed by sickness, ending fatally; but I must confess that, from personal experience, I am unable to confirm this, for I have not remarked that sickness is markedly common after this special procedure.

Mr. Fausset,[1] Surgeon at the Chelsea Hospital for Women, found that out of eighteen such operations sixteen of the patients were sick, whereas out of sixty-eight cases of curettage only forty-seven were sick.

I remember a very striking case of fixation of a uterus where the patient had been vomiting continuously for some weeks, and

[1] *Lancet*, London, June 1892.

where the vomiting stopped immediately after the operation in spite of the anæsthetic.

As regards *hysterectomy* itself, I cannot say that I have noticed any marked tendency either way, except that the fact that some of these operations are very difficult and therefore prolonged, is productive of after-sickness, in some cases owing to the large amount of anæsthetic which it has been necessary to use.

The duration of the operation.—In all surgical operations, I think this is a matter which should not be lost sight of, and I am disposed to think that at the present day, when the surgeon is possessed of confidence in his anæsthetist, he is on occasion somewhat too much disposed to dally over an operation either to investigate some technical point of no great pressing importance, or in the interests of clinical teaching.

Bearing in mind that prolongation of the anæsthesia has a causal influence on after-sickness, the occurrence of tissue degeneration and "secondary death" from chloroform, apart from the *immediate* risks of the anæsthetic, I think it may be well laid down as a surgical aphorism that "once the patient is *under*, no time should be lost in commencing the operation and completing it as soon as possible, both in justice to the patient and to the person immediately responsible for the anæsthesia."

3. THE SKILL WITH WHICH THE ANÆSTHETIC IS GIVEN.—It is scarcely necessary to remark on this factor, as it is sufficiently obvious that a better recovery, and fewer unpleasant after-effects, are to be expected as a general rule when the patient has been kept at a suitable degree of anæsthesia by means of a minimum amount of the drug, than when he has been needlessly saturated with whatever anæsthetic is employed.

4. THE PREPARATION OF THE PATIENT.—The proper preparation of the patient has an undoubted influence of a favourable nature on his condition after the operation as regards the amount of after-sickness. When the operation is one of emergency, it is obvious that anything beyond the most elementary and hasty preparation is out of the question usually, but under ordinary conditions there can be no doubt that the customary two or three days in a home or hospital are most beneficial.

As regards the use of a purgative, and attention to the *primæ viæ*, I think the suggestion, which I believe was made by Professor Chiene—our President—that the time to administer a purgative before an operation was not the night immediately preceding the operation, but the night before that, is a most valuable one. If this be done, the patient is allowed time to recover his normal vascular equilibrium before the anæsthetic is administered; and it must be borne in mind that this is somewhat rudely shaken, generally speaking, when a smart purgative is administered, the depression produced in many cases tending to make the vomiting after the anæsthetic more severe.

A further practical advantage of this custom lies in the fact that the surgeon and his assistants are not so likely to be kept waiting at the patient's door on the morning of the operation, while the patient responds to a "clamant call of nature" at the eleventh hour. I may remark that this has been my fate on more than one occasion.

As regards *fasting*, I think this is often overdone. Sometimes the patient from over-zeal or fear neglects to take any food for twenty-four hours preceding the operation, and mounts the table in a condition bordering on collapse. I have known this to be done frequently in cases of dental extraction carried out late in the day.

I do not think it is generally recognised how very unsuitable a substance milk is as a form of nutriment within twenty-four hours of an anæsthetic. If taken during this period, it is extremely likely to cause sickness. It is almost the first thing which occurs to the medical man, when asked what the patient may have in the way of light food. It is more or less of a delusion and snare, due, I think, to the fact that a temporary hyperacidity is caused frequently by the administration of chloroform or ether, and consequently a large indigestible curd is formed directly milk reaches the stomach, which is bound to cause vomiting and discomfort.

In the *Edinburgh Medical Journal*, 1899, Dr. T. A. Ross propounded a theory, apparently not without some practical foundation of fact, that patients were more commonly troubled with vomiting when they were chloroformed "prepared"—or fasting—than when they were so treated with a full stomach, and he attributed this to want of food causing depression and low blood pressure in the patient; and, as is well known, vomiting is always preceded by pallor and a marked fall in blood pressure. Also on the hypothesis that when chloroform is swallowed, it acts as a gastric irritant, and if the stomach be full the contents act as a diluent.

Dr. Ross—who was at the time a resident in the Royal Infirmary—found that of patients who were prepared for operation, 35·2 per cent. were sick after chloroform, and of casualty cases, practically quite unprepared, only 22 per cent. were sick.

Sir James Simpson never made a practice of preparing patients, and he says that there was "no sickness or vomiting after any cases."

I cannot say that my personal experience bears out either of these findings, generally speaking. I not infrequently have to administer an anæsthetic to patients about 3 p.m. who have come into town for the day "to lunch and see their doctor." Possibly they make "an occasion" of the lunch, but I find that sickness is very common in these cases, and is both dangerous and very disgusting.

5. As to the Condition of the Patient at the Time of the Operation, there is little to add to what I have already said. One point may be mentioned, however, and that is pregnancy must not be overlooked in the female sex; and if the patient be in this condition, surprise need not be expressed if sickness occur on the morning following the operation.

In this connection I remember a case in which the surgeon complained to me that the patient had been very sick after an operation for removal of the breast under ether. Subsequently, however, he told me that the lady had been delivered of a child about seven months after the operation, and he thought this might explain a good deal.

6. The Influence of Age, Sex, etc.—*Age.*—Very young children and very old people are seldom sick.

From the age of 1 year to 12 years the rate increases, and after the twelfth year it declines from 72 per cent. to 29 per cent. at 90.

	Total.	Sick.	Per Cent.
Under 12 months	119	5	4
1 year and over	446	137	31
5–10	555	349	63
10–15	456	331	72
15–20	445	268	60
20–25	285	161	56
25–30	185	96	32
40–50	319	102	32
50–60	363	119	32
60–70	438	138	32
70–80	183	50	28
80–90	17	5	29

Sex.—Females are usually more often sick than males, in the ratio of 5 to 4.

		Sick.	Per Cent.
Males	2130	870	40
Females	1982	1027	51

Temperature and type of patient.—Bilious or lymphatic types of patients are commonly sick. Fresh-coloured muscular young adults, even athletes, are often troublesome, while spare people and those addicted to the plentiful use of tobacco and alcohol are often in no way disturbed by the administration of either chloroform or ether.

Weather and climate.—It would appear that climatic influence plays an appreciable part in the causation of anæsthetic sickness. Everyone who has done much routine work in a large general hospital, especially as a resident, will have noticed that sometimes

for a week or two on end practically every patient is sick after chloroform, while again another week, and no cases of vomiting are noticed, or only a very small percentage.

It seems more than likely that the weather has something to do with this, and it will be found that on close, heavy, and foggy days patients are more commonly troubled with sickness.

Dr. Gunn found in his investigations at Moorfields that sickness was most frequent in January, and least so in March; but he offered no suggestion as to the reason for this.

Colonel Lawrie and other Indian surgeons and writers seem to regard sickness after chloroform as a negligible quantity, and this is doubtless due to rapid excretion of chloroform by the sudoriferous glands being favoured by the warmth of the atmosphere. As to whether chloroform sickness is correspondingly less frequent on hot summer days in this country, I am not able to offer any opinion.

Treatment of Post-Anæsthetic Sickness may be—(1) General, (2) local.—*General treatment.*—It is highly important that after any operation, the patient should be kept in a warm room, where absolute quiet can be maintained.

General anæsthesia is usually accompanied by vaso-dilatation, and frequently also by more or less profuse perspiration; hence the special need for warmth. It is even sometimes advisable to put the patient between blankets rather than sheets. Although the room should be kept at least not lower than 65° F., it must be ventilated to remove as quickly as possible the vapours of the anæsthetic exhaled by the lungs and skin.

Quiet is essential in order that the patient may be able to sleep for the first few hours after the operation, when general bodily discomfort and the smell of the anæsthetic are most in evidence. If natural sleep can be obtained without the use of morphia or other hypnotics, the patient will be much refreshed, and the soreness and smarting from the operation will be less obvious.

It is well to administer a nutrient or simple saline enema immediately the patient has been put back to bed, and thus obviate any discomfort or disturbance for the next five or six hours. Half a pint of normal saline solution will be sufficient.

The value and importance of this measure should be more generally recognised than it is, for it promotes the elimination and excretion by the renal organs and by the skin, and goes far to prevent the stagnation of the body tissues, with unexcreted chloroform and waste products tending to keep up discomfort and sickness. It further helps to make up for loss of fluid from the body which has occurred from hæmorrhage during the operation, and from purging previous to it.

In the after-treatment of such cases, especially when dealing with children, a grey powder on the second day after the opera-

tion is most useful in aiding the elimination of the anæsthetic from the body, and chloroform may frequently be detected, by sense of smell, in the fæces. The abundance of mucus and the presence of chloroform in a child's fæces may be readily demonstrated after quite a small operation, such as circumcision, up to the third or fourth day, unless special precautions are taken to secure elimination. This partly explains the secondary changes found in the liver and kidneys in cases of chronic chloroform poisoning.

Local treatment is directed towards the removal of local conditions. The patient's mouth should be washed out periodically with some mild antiseptic and slightly astringent liquid, such as glyco-thymoline, a teaspoonful of glycerin, of carbolic acid, or of decoction of logwood in a tumbler of water. A tablespoonful of bay rum in half a tumbler of water is also very pleasant and refreshing.

As regards the stomach, the patient may be given with advantage drinks of albumin water made by dissolving the white of one egg in 3 oz. of warm water, and to this may be added a few minims of tinct. nuc. vom. and a squeeze of a lemon. Up to half a pint of this may be taken at once. Plain hot water, with a little baking soda dissolved in it, may also be taken with advantage.

There seems little doubt that the deprivation of fluids which was and still is so rigidly enforced by some surgeons, especially after abdominal operations, is often uncalled for, and even harmful.

The following two cases are interesting in this connection:—(1) A girl of 20, who had undergone an ovariotomy, was left alone for a few minutes by the nurse, and emptied the rubber hot-water bottle containing about 1 quart of warm water at a draught. (2) A Pathan, who had been operated on for foreign body in the stomach, on the day of the operation emptied a large jug of milk in the ward while the orderly was absent for a minute or two.[1] Both made a good recovery. There is commonly an intense thirst for all kinds of fluids after an operation of any length under chloroform, and it seems more than doubtful if it is not one which should be satisfied.

While warm drinks are preferable to cold ones, which are apt to chill the stomach too much, a little effervescing drink is found to be very grateful to patients if given from time to time, and for this purpose, simply plain potass water may be given or a little effervescing citrate of caffeine.

Palliatives.—All kinds of drugs have been brought forward from time to time as specifics in the treatment of vomiting, but they have almost all proved equally disappointing, and are at the best merely palliative measures. I have personally tried only a few of them, but they are copied from text-book to text-book as

[1] See *Lancet*, London, 1901.

standard methods of treatment. Among them are drop doses of tincture of iodine, or vini ipecac.; 3-minim doses of acid hydrocyanic dil.; $\frac{1}{10}$ gr. doses of cocaine; 15 grs. of sodæ bicarb. in a cup of black coffee; 2 to 4 drm. doses of pepsencia; liquor bismuthi (Schacht), and many other compounds, pharmacopœial and extra-pharmacopœial. A good deal has been said lately of the value of chloretone, but I have found it very disappointing after a good trial of it. In cases of violent retching, a mustard sinapism over the epigastrium is often useful.

SUMMARY.—To sum up the treatment of post-anæsthetic sickness in a few words, it may be said that there is no drug or combination known at present which will do anything more than slightly alleviate it. The cure lies in the elimination of the chloroform remaining in the tissues, and more immediately in the dilution of what has got into the patient's stomach. The removal of chloroform is carried out by means of the lungs, skin, bowel, and kidney, and to the stimulation of the functional activity of these last-named organs must rational treatment be directed.

PRESENT VIEWS ON CANCER.—A RÉSUMÉ.

By R. F. C. LEITH, M.B., F.R.C.P.Ed.

THE present is a suitable time to inquire what progress the study of cancer has made within the last year. It is embodied in a mass of literature of home, continental, and American production much too large to be referred to in detail. It deals with the statistical, the histological, the experimental, and the curative side of the disease. Of these, the least satisfactory is the last, for all the evidence points pretty clearly to the failure both of Doyen's serum and of radium. The Committee appointed by the French Academy of Medicine to investigate the claims of Doyen's serum has reported that in none of the cases investigated was there any evidence of amelioration, much less of cure. The claims of radium have fared little better, but the extraordinary amount of activity and interest in this branch of the subject may be estimated when it is stated that the papers directly bearing upon it, which have appeared during the last year, number fully fifty. The assertion, now well known, that radium exerts a special action not only upon the parenchymatous cells of cancer, but also upon its connective tissue stroma, retarding the process of cell division and leading to degeneration and death of the cells of the cancer, and stimulating the stroma to over-production, so as to bring about the disappearance of the cancer and its replacement by fibrous tissue, is now shown to be unfounded. There is no doubt that many superficial cancers have disappeared, apparently, under the action of radium, but the result of recent work makes it probable that the radium in these

cases merely exaggerated a localised spontaneous process. A similar effect may be produced by the injection of adrenalin: and as favourable results with radium are best obtained in cancers in which natural necrosis of many of the epithelial cells of the alveoli is observed, it is likely that a diminution of the blood supply extends this necrosis, and leads to a great overgrowth of the connective tissue in and around the tumour. The other lines of investigation—the statistical, the histological, and the experimental, particularly the last—have furnished us with facts likely to prove of more lasting value. It is true that the origin and cause of cancer has not yet been discovered, but much progress has been made in the accumulation of facts, which may have an important bearing in the future in solving this problem. The parasite theory of cancer dies hard. It is still with us, and Professor von Leyden has lately, in an address delivered before the Berlin Medical Society,[1] in which he discards the other theories, given it his strong support. He bases his conclusion upon—(1) The distribution of cancer in animals and its sites in man; (2) the structure and character of the cancer parasite; and slightly upon (3) chemical products of the analysis of cancerous tissue. He states that the majority of cases of cancer in the animal kingdom are found in domestic animals, *e.g.* rats, dogs, horses, and oxen, which are in close contact with man, particularly in the neighbourhood of hospitals and pathological institutes, and that genuine cases of cancer are unknown amongst these animals in the wild state. He thinks that there is some evidence of a similar kind in man, which may be grouped thus—(1) Cancer originates in man locally in those portions of the body which a parasite can easily reach, as they are in contact with the external world—the breasts, the gastro-intestinal tract, the genital organs, the lungs, the face, and the lips; (2) the comparative immunity of the negro in Africa, compared with his American brother, who is frequently attacked; (3) the reported cases of direct transference of cancer from man to man, the so-called "cancer à deux": and (4) the experimental transference of the disease from animal to animal of the same species. The last he regards as more than a mere transplantation, since it does not merely continue its growth, but alters its essential characters, and produces a progressive and ultimately fatal disease. The source of infection he believes to be a parasite resident within the parenchymatous cells of the cancer, always easily distinguished from all other cell inclusions by its characteristic bird's-eye appearance. The chemical results so far obtained, though they show certain striking differences between cancerous and healthy tissue, have shed no light upon the problem. The arguments in favour of the parasitic theory will have to become much stronger than von Leyden has made them, if it is to overcome the strong antagonistic proof already given by Stiles,

[1] *Berl. klin. Wchnschr.*, 1905, March 27.

Pianese, Orth, and others, not to speak of further evidence constantly being brought forward. Thus we find in the same number in which von Leyden's paper appears there are two others which take an opposite view; *e.g.*, O. Israel contends that the entrance of a parasite into a cell always ends in the death of either the one or the other, and cannot cause much, if any, cell proliferation; and von Hansemann declares that we have absolutely no data upon which to base a theory of cancer which will hold. The latter discusses all the theories, and finds them wanting. He says the occasional occurrence of a cancer following upon an injury offers no scientific explanation of the origin of the disease, and yet it is all the evidence which can be brought forward in favour of the traumatic theory. Giuseppe Maniscalco does not agree with him, for, after a critical review[1] of the latest researches in this field, he says that he thinks that traumatism and repeated irritations are true causes of cancerous growths. He cites experiments made by himself upon the stomach of dogs in support of his view. He believes that a change of a regenerative process in glandular epithelium into a morbid proliferation (which may account for cancer) is produced by the addition of an inflammatory process. Further work is needed before we can accept this statement as even probable. The theory that cancerous growths are allied in some way to reproductive tissue, promulgated first by Beatson, and then by Farmer, Moore, and Walker, has received additional help from the latter three writers in a paper to the Royal Society on 11th May, in which they show that, in addition to the remarkable similarity existing between the forms of nuclear division in cancerous and reproductive tissue, there is a further peculiar resemblance between these two tissues in the possession by a part of their protoplasm outside and near to the nucleus of a highly characteristic structure, namely, a number of small vesicles in the archoplasm of the cells during the process of spermatogenesis, which eventually fuse together, forming one large vesicle; this vesicle possesses a well-defined wall and clear contents, except for one or more darkly staining granules. A precisely similar set of changes occurs in the protoplasm of cancer cells, which the authors have called "Plimmer's bodies," since they were accurately described by him several years ago. They suggested that these peculiarities might indicate the retention of ancestral characters on the one hand, and the reversion to them on the other. Professor Chiene, in his Introductory Lecture to the class of operative surgery, published in the June number of this Journal, also seeks to find a sexual explanation for cancer. He argues that, as all the cells of the human body spring from the union of the sperm and the germ, they must at all stages and times retain the paternal and maternal elements inherited from these first cells, and that so long as these two elements duly balance one

[1] *Riforma Med.*, Roma, 1905, April.

another, as they must always do normally and in health, so long will cancer, or other tumour growth, be impossible; but that, whenever that balance is lost, then the immediate or exciting cause of cancer or other tumour growth may come into play. It follows that the exciting cause is not likely to be any specific agent, but any ordinary irritant acting upon an inherited excess in the tissues of either paternal or maternal element. He prefers the latter, inasmuch as reproduction is the special attribute of maternity. Beyond suggesting the therapeutic possibilities of testicular and ovarian extracts, he does not, however, carry his interesting argument further.

Great progress has been made in other directions, which may yet be found to throw much light upon the cancer problem, namely, the statistical and the experimental side. Reports by Cancer Research Associations on the Continent, in America, and in England have lately appeared, containing much valuable data. It will suffice here to refer to two of them—that of the Middlesex Hospital, vol. v., edited by Lazarus-Barlow, and that of the Imperial Cancer Research Fund, by Bashford. The former contains a number of papers, most of which are statistical, and deal with cancer ages and sites, with cancer of the mamma, liver, prostate, etc. The tables of the cancer ages are most instructive, being compiled from 2073 cases in males and 4659 in females admitted into the Middlesex Hospital from 1746 to 1904. The mean age of the males was 55·2 years, and of the females 49·9. Cancer of the alimentary tract is about seven times as common in males as in females, but this difference gradually and uniformly diminishes as the seat of the primary growth is lower in the tract. In males 80 per cent. of all cancer affects the alimentary tract, whereas in females it (the same percentage) is the generative organs (including the breast). In both sexes the generative organs are affected earliest, the cutaneous system last, while the alimentary system holds an intermediate position. The statistics seem to show that there has been a general increase in cancer, not markedly associated with any particular organ, but most evident in connection with the alimentary tract. Part I. of the Report of the Imperial Cancer Research Fund deals with many of the same subjects, and contains the statistical investigations of the past two and a half years, giving data of upwards of 5000 cases of cancer which have been examined microscopically. The data of these cases were obtained through the valuable collaboration of some of the metropolitan hospitals, of Dr. Tatham of the General Register Office, of various Irish hospitals, of the officers of the Indian and Colonial Medical Services, of members of the veterinary profession, as well as of many public and private persons at home and abroad. They show that an increasing number of deaths are now assigned to cancer. Does this mean that cancer is increasing? This may or may not be the proper interpretation, but it is not

safe to make it until we can be sure of ascertaining beyond doubt all the cases of cancer which occur in a known standard population. It is fairly well established already that cancer increases as life advances, and these data now show that the same thing is true of sarcoma. They have given a new significance to this age incidence, by showing that the age-period at which malignant new growths occur in the different organs of the body presents a general parallel to the association of the disease with age, being earlier in those organs attaining development early and ceasing their active function soon, than in those doing so late. Some returns have already been obtained as to the occurrence of cancer in native races. These are too few at present to dwell upon, but it is interesting to note that in the case of India in the course of the past year 146 cases of malignant tumour were in natives subsisting on a vegetable diet, 137 in others whose food was mainly flesh, and 222 in others living on a mixed diet.

It is on the experimental side of the inquiry, with which Part II. of the Report deals, that the most striking results have been obtained. Attempts have been made to inoculate every malignant tumour obtained in a living state during that period by Dr. Bashford and his colleagues. These include growths from the horse, dog, cat, rat, mouse, and carp. All the inoculations failed except those in the mouse, and although the number in the horse was only two, in the dog, cat, and rat they exceeded 900. In mice a very great number of inoculations had been made, and many of them were successful, so that almost 3000 mice with propagated cancerous tumours were under observation during the past two years. Only a small proportion of the transplantations succeeded, namely, 47·3 per cent. in Berlin wild mice, 1·4 per cent. in London wild mice, and 0·54 in London tame mice, in inoculations made with a tumour found growing naturally in a Berlin wild mouse. Racial differences or strains, therefore, seem to influence success or failure, but how they do so we do not yet know. They are not very powerful, for when the initial difficulty of transplanting a tumour from one strain of mice to another had been overcome, the percentage of success reached approximately that obtained when mice of the same strain were used. The other influences determining success or failure are so far unknown to us. Examination of the tumours thus successfully propagated show that in all generations the new tumours are the product of the transplanted cells. These cells show a practically unlimited power of growth, the parenchyma of the cancer coming entirely from them, while the stroma comes from the tissues of the host due to the irritation of the growing cancer cells. From a single mouse tumour, an amount of tissue had been produced by successive transplantations, equal in bulk to more than a thousand mice. In mice, as in other animals, it is (most probably) the old in which sporadic cancer naturally occurs, but

transplantation is even more successful in young than in old mice. Propagated cancer possesses all the properties of sporadic cancer. The short span of life of the mouse, about three years, makes serial observations the easier. Large numbers of healthy mice have been kept in the same cages with mice suffering from both sporadic and inoculated cancers of all kinds for fully two years (two-thirds of their span of life), and none of them became affected with cancer. This would seem to exclude the possibility of *direct* transmission. It does not exclude the possibility of transmission by an intermediate host; but this also may be excluded, not only because there is absolutely no evidence in favour of such a hypothesis, but also because of the light thrown upon the subject by the experimental investigations. A cancer could only be made to grow when some living cancer cells from the tumour of an animal had been introduced into another animal of the same species. The tissues of the new hosts never became cancerous. It is impossible that cancer in man can always have genealogically descended from a pre-existing growth which had arisen in the same or an allied part, for this would mean direct genealogical descent for each species of animal, and for each of its tissues. Cancer cannot arise *de novo* in each individual attacked; but what the changes are, and why they occur, which transform a normal cell into a cancer cell, are at present unknown to us. Age seems to be an undoubted factor. A study of the physiological laws of growth show that all activity and proliferation are in keeping with the normal duration of life and normal size of the animal. "The number of cell divisions—in other words, the number of cells—which intervenes between the fertilised egg and death from old age, is constant within limits." The different tissues of the body are thus differentiated. In a cancer the same active cell division is seen, but it is limitless, and never results in differentiation into tissues, but only in a monotonous reproduction of the same tissue. The problem before us is, why should this form of activity come on towards the end of life? It is almost as if it were an attempt, a vigorous but perverted one, to continue the life of the individual, an attempt to form a new individual, or a new tissue, at the end of the normal span of its life, and putting enough energy into it to produce a thousand or more, but forgetting that an individual is not all epithelium. The laws of natural growth may yet come to have an important bearing upon the origin of cancer.

REMARKS ON CERTAIN POINTS IN TRICUSPID OBSTRUCTION.

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(Plates VI. and VII.)

The following observations were made on a very interesting case of tricuspid stenosis lately under the care of Dr. G. A. Gibson in the Royal Infirmary, and it is through his kindness that I am enabled to publish it. The case is full of interest from at least three points of view: (*a*) The cardiac lesions; (*b*) the pulse and polygraph tracings; (*c*) the cyanosis, and the effect of treatment on it.

The notes of the case are—

The patient is a girl, æt. 21, a dressmaker in Edinburgh. She complains of extreme breathlessness and pain in the left side of her chest. She gives no hereditary history of rheumatism. Her father is alive and healthy. Her mother is dead—she died of heart disease. She has four brothers and three sisters, all alive, and quite healthy. Her social history is a good one. She states that she has always had plenty of good food. She is a total abstainer. She lives at home with her father, and is happy and comfortable. Until eighteen months ago she was engaged in dressmaking. The work was not hard, but she had to give it up as she found even the slightest exertion too much for her. Since then she has done no work, but has rested at home.

Her past history of illness is interesting. She has never had rheumatism of any sort, but had several attacks of chorea between the ages of 8 and 12. One of these attacks was a severe one, and for this she was in the Sick Children's Hospital for thirteen weeks. Six months later she was admitted to Ward 28, Royal Infirmary, Edinburgh, and detained there for three weeks owing to a similar attack. Her heart began to trouble her at the age of 13, with dyspnœa on exertion, and she had since been in hospital several times for it, but previously always in Ward 28. She has met with no accidents. Her menstruation began at the age of 15, and has always been regular.

Her present illness commenced in January last, when she became very breathless; so much so, that she found it impossible to go up or down stairs. She noticed shortly afterwards that her feet and ankles swelled, especially at night, and that she had an occasional stabbing pain on exertion over the heart, which shot down the left arm as far as the elbow. The pain lasted, as a rule, one or two minutes, and was very severe; so much so, that during a paroxysm she found it impossible to get breath. These symptoms gradually increased in severity until admission on 11th May 1904.

She presents a picture of extreme cyanosis, her nose, lips, ears, and hands being bluish purple in colour. Her feet and ankles are somewhat œdematous. She is not emaciated. There is no evidence of

jaundice. Her face is very anxious-looking. She lies comfortably, as regards position, in any attitude. Her temperature is normal.

Circulatory System.—The patient suffers from occasional stabbing pain over the præcordia. It varies in intensity, and sometimes shoots down the left arm as far as the elbow. The pain is most severe when she has been exerting her-self. She has suffered for long from palpitation, in a very troublesome degree. She never faints, but frequently, when walking, feels giddy; this is relieved by standing still for a few moments. She has for many years suffered from dyspnœa on exertion, and has not been able to walk more than a few hundred yards for the last two years; since the age of 15 years she has not been able to walk more than a quarter of a mile without resting. She had slight dyspnœa on exertion after age of 13; before that time she was quite well, and won races at school at the age of 11½.

On inspection, the præcordia appear well formed. There is diffuse pulsation visible in the fifth and sixth left interspaces. The pulsation is visible outside the nipple line about 1 in. There is slight epigastric pulsation, and very slight episternal pulsation. Slight pulsation is visible in the vessels of the neck. The cardiac impulse appears somewhat heaving in character. Tracings from the radial pulse along with the venous and liver pulsations are annexed.

On *palpation*, there are well-marked presystolic and diastolic thrills felt over the præcordia in the fourth, fifth, and sixth left interspaces about 3 in. inside and 1 in. outside nipple line. There are also well-marked presystolic and diastolic thrills felt to the right of the sternum in fourth and fifth interspaces. These latter are somewhat finer in character than those to the left of the sternum, and there is a well-marked line of demarcation between the left and right thrills. The cardiac impulse is somewhat heaving in character, and is very diffuse. The thrills are palpable, well out into the axilla.

On *percussion*, the upper border is at the lower border of the third rib, the right border is 4 in. from mid-sternum, and the left border is at the level of the third interspace, 4½ in. from mid-sternum. At the level of the fourth interspace it is 5½ in., and at the fifth interspace 6¼ in. from that line.

Auscultation.—*Mitral area.*—There is a well-marked presystolic murmur. It is rough, grating in quality, and is best heard to the right of the nipple line. There is also a loud systolic murmur, which replaces the first sound. It is propagated outwards into the axilla, and has its point of maximum loudness just to right of nipple line. A faintly audible diastolic murmur is also present, and is somewhat variable.

Aortic area.—Systolic and diastolic murmurs, which are markedly increased in loudness on going down sternum towards mitral area, and are not heard in the vessels of neck.

Pulmonary area.—First sound replaced by a soft blowing systolic murmur. Second sound markedly accentuated, but closed.

Tricuspid area.—A presystolic murmur is heard, which is harsh and grating in quality, and has its point of maximum intensity 1 in. inside right nipple in fourth interspace. A systolic murmur is present, and is propagated towards the right nipple; it can be distinctly heard 2 in. outside and to the right of the right nipple.

Pulse.—Vessel wall is not thickened. Pressure somewhat low. Rhythm irregular. Rate, 120. Tracings of the pulse, along with the jugular and hepatic movements, are given in Fig. 1 and Fig. 2.

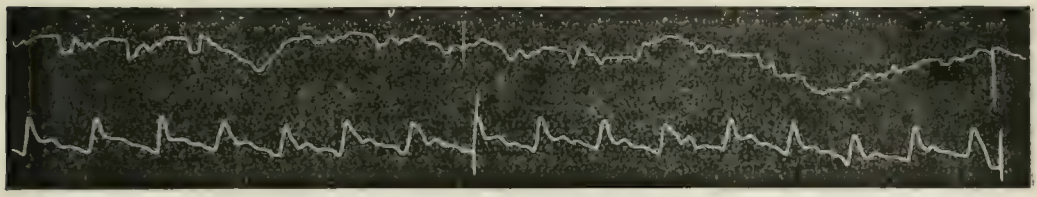

FIG. 1.—Tracing from jugular vein and radial artery; the venous tracing shows auricular, carotid, and ventricular waves.

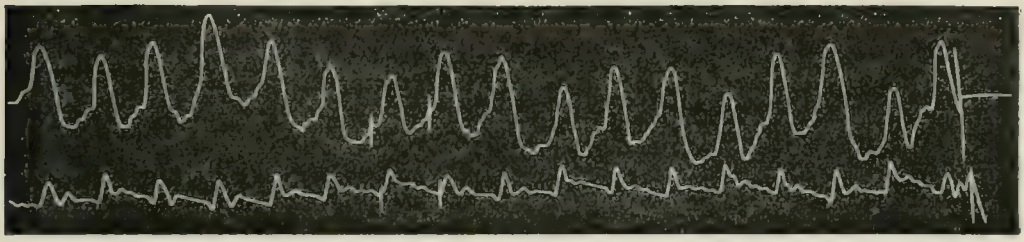

FIG. 2.—Tracing from liver movements and radial pulse; the liver tracing shows a slight impulse before the main ventricular wave.

ALIMENTARY SYSTEM.—The lips are very cyanotic. The teeth are bad and irregular. The tongue is not furred, but is somewhat flabby. The patient says that frequently after walking she feels sick and vomits. This symptom is also occasionally present in the mornings on waking. The vomit is, as a rule, very watery, and contains little food. There is no pain or weight in the stomach after eating, but after a large meal she feels a sensation of tightness and constriction over the præcordia. For the last six months she has been much troubled with flatulence. There is no acidity. The bowels are very constipated.

ABDOMEN.—There is considerable distension. The abdomen, as a whole, is prominent, and the umbilicus retracted.

On *palpation* (especially over the epigastrium), the patient becomes very dyspnœic, and is troubled by the slightest pressure. Other than this, there is no tenderness; and, owing to dyspnœa produced, it is impossible to palpate the liver or spleen.

The *percussion* sound over the abdomen as a whole is tympanitic; there is no dulness in the flanks, and no thrill.

The *stomach* reaches the sixth rib above, and its lower border is $1\frac{1}{2}$ in. below umbilicus. There is no succussion. The upper border of the liver is at fifth interspace, and it reaches down to $\frac{1}{4}$ in. below costal margin.

The URINARY SYSTEM shows no subjective phenomena. The amount of urine for twenty-four hours is 47 oz. The sp. gr. is 1015; reaction, acid; there is no albumin, blood, bile, or sugar. The urea amounts to 7 grs. per oz. The centrifuge yields no deposits.

The RESPIRATORY SYSTEM on examination reveals marked emphysema, but except for this, nothing to note.

The HEMOPOIETIC SYSTEM has some interesting points. There is no enlargement of glands. The blood has the following facts on examination: The red blood corpuscles number 8,800,000 per c.mm. The haemoglobin is 110 per cent.; and white blood corpuscles are 9000 per c.mm.

There can be little doubt, with physical signs such as are described, as to the nature of the cardiac lesion, namely, tricuspid obstruction and incompetence, along with similar lesions at the mitral orifice. The extreme cyanosis, the direction of cardiac dilatation, the thrills, and the murmurs all point unquestionably to the existence of marked obstruction at the tricuspid orifice. The associated obstruction at the mitral orifice is in no way unusual, for statistics show clearly that in almost two-thirds of all cases of tricuspid obstruction a similar lesion is found at the mitral valve.

But although the case is an interesting one merely from the existence of the lesions, the pulse tracings and blood changes are also noteworthy. The tracings, as taken with the polygraph, show, as might be expected, a well-marked pulsation in the liver. It is interesting, however, to note that the tracing shows the pulsation to be ventricular, and not auricular in origin. It has been stated by Mackenzie, that in cases of tricuspid stenosis where, as might be expected, the auricle is much hypertrophied, the waves of blood sent back to the liver are of sufficient strength to cause an auricular pulsation, and that therefore an auricular pulsation in the liver is almost diagnostic of tricuspid stenosis. In the tracings taken in this case, the ventricular character of the pulse is marked, and as from the physical signs it is impossible to doubt the diagnosis, the result is interesting. It may possibly be explained by the fact that the condition is not one of pure stenosis, and that the incompetence may be so great as to impress the tracings with a ventricular character at the expense of the auricular features.

The changes in the blood under the influence of treatment are somewhat unusual. On admission, as stated above, she was extremely cyanosed, and the blood count of the erythrocytes was 8,800,000.

She was treated for two days with absolute rest and tinct. digitalis, 5 minims 4-hourly, and her blood count fell to 5,500,000.

Treatment was then stopped for two days, and the blood counted 6,000,000.

She was then treated with oxygen only, and after two days her blood counted 4,500,000.

The oxygen was then continued, but in a very diluted form, for six weeks, and the count gradually rose to 5,500,000.

Treatment was then stopped except for rest in bed, and at the expiry of two days her blood again counted 8,400,000.

From this point the results were—

Oxygen, ten days . . .	Red blood corpuscles,		5,500,000
Oxygen, very dilute, ten days.	,,	,,	5,600,000
No treatment except rest, eight days	,,	,,	6,000,000
No treatment, thirteen days .	,,	,,	7,000,000
Rest in bed, seven days . .	,,	,,	6,400,000
No treatment, one month .	,,	,,	5,000,000
Oxygen and rest, twelve days.	,,	,,	5,500,000
No treatment, twelve days .	,,	,,	5,400,000

These results appear to show that oxygen has some influence in reducing cyanosis, for, in this case at least, the count was reduced to an even lower figure than that produced by tinct. digitalis.

At first sight, the results attained later in the course of the patient's residence in hospital appear at variance with those of the first two months. It may be explained by the fact that a gradual return of compensation had occurred, and with the heart strengthened by the prolonged rest, such striking changes were impossible.

In the further progress of the case there was little of interest to note, except the occasional presence of a pulmonary diastolic murmur. The murmur, which replaced the second sound, was soft and blowing in character, and was interesting as pointing to an increase of pressure in the pulmonary circulation.

The patient was readmitted on 27th November 1904. She stated that, since leaving hospital in September, she had been staying at home. She had been able to be up every afternoon and evening. She had had no dyspnœa except when going about, but complained of much pain on both sides of the chest on exertion. She was much troubled with flatulence.

On examination, a diffuse apex beat in the fifth and sixth intercostal spaces was detected; also slight pulsation in the vessels of the neck and episternal notch. No epigastric pulsation was evident.

On palpation, both the thrills previously described were present and unaltered in character.

Percussion was as follows:—Upper border at second interspace on both sides of the sternum. The right border at the level of the third interspace was 3 in. from midsternum; at the level of the fourth, $3\frac{1}{2}$ in.; at the fifth, 4 in.; and at the level of the sixth rib, $4\frac{1}{2}$ in. from midsternum. The left border of the heart at the level of the third interspace was $4\frac{1}{2}$ in. from midsternum; at the fourth interspace, $4\frac{1}{2}$ in.; at the fifth, $4\frac{1}{2}$ in.; and at the level of the sixth interspace, $4\frac{3}{4}$ in. from midsternum.

Auscultation at this time presented no new features save an increased roughness in the quality of the first sound in the pulmonary region. The pulse was 100.

On 10th February it was noticed that the tricuspid thrill was

late diastolic in time, and that the mitral presystolic and diastolic murmurs were almost inaudible. She became gradually worse, and died on 26th February while asleep.

During her second residence in the hospital the blood changes were as follows:—

Nov. 29.	Red blood corpuscles . . .	6,000,000
,,	White blood corpuscles . . .	500,000
,,	Hb	100 per cent.
No treatment except rest, seven days . . .	Red blood corpuscles,	6,000,000
Oxygen and rest in bed, five days	,, ,,	6,400,000
No treatment for five days .	,, ,,	6,800,000

From that date until four days before her death, her blood count, although frequently taken, was almost uniform, namely:

Red blood corpuscles	7,200,000
White blood corpuscles	500,000
Hb	100 per cent.

The subsequent autopsy entirely bore out the diagnosis formed, as will be seen from the following report:—

"M. B., æt. 22. Date of death, 26th February 1905. Date of sectio, 27th February 1905. Body well nourished. Rigor mortis general. Very marked lividity about the lips. There is no œdema. There is no fluid, nor are there any adhesions in either pleural cavity. The pericardial sac contains 1 oz. of clear fluid.

"*Heart.*—The right auricle and left auricle are filled with post-mortem clot. The right ventricle contains a considerable amount of mixed clot. The arterial valves are competent. The right auricle is very markedly dilated. The tricuspid orifice is narrowed and the segments are thickened, especially along the free margins. The chordæ tendineæ are thickened and shortened. The right ventricle is markedly dilated, and the wall is hypertrophied. The muscle is firm. There is no evidence of any interstitial myocarditis. The muscle bands in the right ventricle are very markedly hypertrophied. The pulmonary artery is dilated, and shows patches of atheroma; the segments are slightly thickened. The left auricle is dilated and the wall hypertrophied. The appendix is elongated and dilated. There is no ante-mortem clot. The mitral segments are thickened, and show some calcareous deposit near their free margins. The mitral orifice is narrowed. There is very marked mitral stenosis. The chordæ tendineæ are thickened and shortened. The apices of the papillary muscles are in contact with the valve segments. The chordæ tendineæ are also fused. The left ventricle is not dilated. The cavity is normal. The wall is thin. The muscle is firm. The aortic segments are thickened but not calcified. The aorta is small and narrow. There are some patches of atheroma. The coronary arteries are dilated and slightly thickened. There is no special degenerative change.

"*Left lung.*—Weighed 14 oz. The bronchial glands are not enlarged. The bronchi are slightly congested. The pulmonary artery shows a

Right side of Heart opened to show tricuspid orifice.

Left side of Heart opened to show mitral orifice through which a match has been passed.

very marked degree of atheroma. The whole lung is emphysematous. On section there is very marked chronic venous congestion. There is some œdema of the upper lobe. The lower lobe is congested and collapsed throughout.

"*Right lung.*—Weighed 17 oz. The bronchial glands are similar to the left side. The bronchi are congested. The pulmonary artery is very markedly atheromatous. The whole lung is emphysematous. On section the lung is a very good example of chronic venous congestion. The upper lobe is œdematous. The lower lobe is collapsed towards its lower part."

ON THE TREATMENT OF ACUTE PERITONITIS.

By Professor K. G. Lennander, Hon. F.R.C.S. Eng. & Ed.,
Upsala, Sweden.

(*Concluded from page* 116.)

Enterotomy with emptying of the paralysed intestine during the operation; enterostomy.—It stands to reason that a paralysed intestine has to be emptied during the operation. If it is the sigmoid flexure that is paralysed, a tube is introduced into the rectum. In the transverse colon, the cæcum and the small intestine, an opening must be made in the bowel. What is the best method of emptying a paralysed coil of intestine? Is it better to close the incision immediately, or is it preferable to introduce a drainage tube? If the coils of the intestine have protruded, or it has been necessary to place them extra-peritoneally in order to obtain access to encysted collections of pus, the author has made one or several incisions into the intestine and tried to let out as much gas and fluid as will render it possible to replace the gut without using force. Previously he has been in the habit of closing these incisions; now he is inclined to introduce a tube into every incision.

Since 1893 the author has made it a rule to insert a tube in the cæcum, if the cæcum or the cæcum and the nearest portion of ileum have been paralysed. In cases where a paralysis may be expected after the operation, he placed the cæcum in the abdominal incision between tampons in order to be able to make a cæcal opening if it is found necessary. But in recent years he has not been inclined to make fistulæ in the small intestine, though he has fully understood their importance for curing paralysis of the small intestine. As far as he can remember, every fistula in the small intestine has resulted in an *anus præternaturalis.* Therefore he has tried to fight against the paralysis of the intestine—(1) By emptying the intestine during the operation by enterotomy (one or several incisions); (2) by a cæcal fistula; (3) by frequently repeated stomach lavage during the after-treatment.

After the operation only hot water has been given *per os* until the patient has passed flatus; after this mild laxatives and often eserine (salicylas physostigmicus) hypodermically.

In the winter 1903–1904, when Dahlgren represented the author at the clinic in Upsala, Dahlgren introduced a more methodical emptying of the intestine during the operation.[1] This method was called *milking of the intestine*. At the Scandinavian Congress of Surgeons in Gothenburg in 1904, Dahlgren described his method. "The middle portion of the intestine having been identified, a transverse incision is made 1 to 1·5 cm. in length. While an assistant fixes the coil, the 'milking' is performed by the operator in such a way that by stroking the intestine methodically he passes the contents to the incision and out through it, first from the nearest coils (20 to 30 cms.), then from those further away, until all are emptied. The best way is to compress the intestine with the forefinger and the middle finger of both hands, wearing rubber gloves; one hand follows the other inch by inch." During the whole time the bowel is copiously irrigated with saline solution. This method was used in eight cases, four of which recovered. Dahlgren is of opinion that it was the means of saving patients whom he thought would inevitably succumb. He has invented an instrument with two rollers kept together by a steel spring, in order to facilitate the "milking" of the intestine.

The author has gradually become persuaded that his bad luck with fistulæ in the small intestine has been due to faulty technique. He now intends to make all temporary fistulæ after Witzel's method. Where the tube protrudes from the intestine, it is fixed to the wall of the gut by one or two sutures. For the small intestine soft tubes of at most 3 mm. diameter are used; for the cæcum also a soft tube of 3 to 6 mm. diameter. The author has had a death from a pressure sore on the inner wall of the cæcum resulting from the use of a rigid tube. If the small intestine has to be emptied at the operation, the author will do so either in the same way as before, or he will try Dahlgren's method. Into every incision in the bowel he will introduce a tube, according to Witzel's method. These tubes (there may be one or more) will all be placed in the paralysed portion of the intestine. They will continue to act until the wall of the intestine has begun to recover and the paralysis has ceased. At least one fistula should be made a good way above the paralysed portion (Heidenhain),[2] so that the secretions from the digestive organs may escape freely before they have time to putrefy. If nearly the whole intestine is paralysed, the highest fistula will be placed very near the duodeno-jejunal junction.

[1] Dahlgren, *Arch. internat. de chir.*, Gand, tome ii. p. 127, *Nord. Tidskr. f. Ther.* vol. iii.

[2] Compare also Gebhardt, Busch (both in *Deutsche Ztschr. f. Chir.*, Leipzig, Bd. lxxiv.), and Barth, *Deutsche med. Wchnschr.*, Leipzig, 1905.

The author intends to make a slight modification in Dahlgren's method. Where the small intestine is not paralysed in its whole length, he will select the middle of the paralysed coil and open it. After the intestine is emptied, the opening is converted into a Witzel's fistula, which thus will be placed nearer to the ileo-cæcal junction than if the enterotomy had been made in the middle of the small intestine. If during the after-treatment the portion above the fistula alone regains its functions, the loss of intestine will be less.

In every case of widespread paralysis of the intestine, the author thus will empty the intestine at once when operating, and make at least three Witzel's fistulæ—one in the paralysed region, one above this, and one in the cæcum.

Dahlgren thinks a "milking" indicated even in cases of grave enteritis, whenever this illness is the cause or a complication of a spreading, purulent peritonitis. His opinion is confirmed by two cases of his own. The author thinks Dahlgren is quite right, and he will also empty the intestines, but he will change the enterotomy opening into a fistula. Many cases of purulent peritonitis caused by a continuous infection from an intestine suffering from enteritis are most unfavourable, because the source of infection cannot be removed. The bacteria pass straight through the diseased wall of the intestine. It is at all events a rational undertaking to empty the intestine by one or several fistulæ. If a smaller portion of the intestine is much more affected and diseased than the rest, it should be resected or excluded.

If peritonitis is complicated by grave colitis, the author immediately makes a fistula in the cæcum and introduces a tube into the rectum, followed by irrigation from both ends. The author believes that not many years will elapse before this will be the usual treatment of severe cases of acute colitis.

How are the intestinal fistulæ to be dealt with during convalescence?

The state of the bowel may be tested by plugging the highest placed tube several times each day. Free passage from this tube is a sign that the paralysis of the intestine is being recovered from. If the improvement continues, the highest tube is removed next day, whereupon the aperture in the intestinal wall is immediately closed by a little purse-string suture. If the improvement still continues, the other tubes in the small intestine are treated in the same way. During all this time the cæcal tube is of great importance. As a rule, the colon is the least affected part of the intestine. Therefore its mucous membrane is able to absorb and possibly digest. Advantage should be taken of this to introduce through the cæcal tube large quantities of water with glucose, alcohol, and other drugs, of which digitalis may be the most important. As soon as the contents which escape from the small intestine are considered sufficiently normal, they are mixed with easily digestible

food and injected through the cæcal tube. Even food that has been peptonised in other ways may be similarly injected.

If it happens that a portion of the small intestine becomes impermeable, or, to express it in other words, if one of the fistulæ in the intestine becomes an *anus præternaturalis*, one has at once to consider the question of performing an anastomosis with or without exclusion of the affected segment of intestine.

Operations for acute peritonitis in connection with internal strangulations, etc., have hitherto yielded bad results. They show, however, considerable improvement, since the effort is now made to resect through perfectly sound intestine (König, Kocher, Barker, and others). If the resection is made through a coil which is paralysed, one should, according to the author's opinion, at once make a Witzel's fistula above the paralysed coil.

It is hopeless to use force in replacing a paralysed intestine that has protruded, and then to close the wound with violent stretching of the abdominal walls, with or without drainage. If the intestine is to have a fair chance of regaining its functions, there must be room for the peristaltic movements. It is better to leave the whole thing outside the abdomen, as this is still compatible with the recovery of the patient (König). If there is not room in the peritoneal cavity for all the extruded intestine, after it has been emptied, the author allows the most damaged portion to remain extra-peritoneally, packed in gauze and indiarubber tissue, and above this coil a Witzel's fistula is made. If the strength of the patient admits of a more prolonged operation, it is better to resect the diseased coil for which there is no room in the peritoneal cavity. The end of the proximal part of the intestine is then placed in the abdominal incision near the cæcum, into which has been inserted a tube (Witzel). A tube of 2 to 3 mm. diameter is also placed in the oral part of the small intestine. The possibility of draining the centre of the abdomen is considerably increased after such a resection of the protruded bowel. If the patient survives, one should try to preserve the ileo-cæcal valve and the cæcum intact when making the anastomosis; it should be made on the oral side of the valve.

The author has not yet practised the systematic making of fistulæ in the small intestine in cases of intestinal paralysis, such as he now proposes. Nor has he made any resection of the small intestine against intestinal paralysis, for instance in cases of peritonitis caused by appendicitis or enteritis. After a long spell of bad luck, he has arrived at the opinion that, if one has not had the opportunity of operating before the occurrence of intestinal paralysis, the intestine must be emptied and drained before the body has been incurably poisoned; otherwise death from stercoræmia is unavoidable.

Narcosis.—If possible, only ether; if necessary, chloroform at first, then ether. One removes the ether while operating, for

instance on the stomach, intestines, and mesenteries, without simultaneous stretching of the parietal serosa.

The abdominal incision—Its position depends upon the diagnosis. —If more than one incision is necessary, the region is opened first where the peritonitis is most recent.

In slight cases this incision is only an exploratory laparotomy, by which one gains information as to the extent of the affected region and on the nature of the inflammation, but in graver cases the incision is to permit of cleansing of the abdomen, it may be the making of a Witzel's fistula, and for tamponing and draining.

The whole operation is planned so as to avoid a second infection of the peritoneal cavity by an unexpected opening of purulent centra.

In many cases an incision in the middle line is the best. Without great risk of hernia, it may be combined with a transverse incision above or below the umbilicus, in any of the *inscriptiones tendineæ;* if it is found desirable, the transverse incision may be extended to the lumbar region. In the case of very difficult operations below the umbilicus, a medial incision, combined with the separating of half the abdominal wall from the symphysis, Poupart's ligament, and the crest of the ilium, gives good room and opportunity for combined tamponing and draining.

In order to get access to the subphrenic space, it is best to make an incision along the edge of the thorax, according to the length and shape of the thorax, with or without resection of the cartilages of the eighth and tenth ribs. From the point of the tenth rib the incision may, if necessary, be lengthened downward and backward to the lumbar region, either without resection of the eleventh and twelfth ribs, or, which the author thinks better, with resection of both or one of these ribs. From such an incision one may, even in the case of a long thorax, take a survey of and treat every part of the subphrenic space in question. The drainage obtained is the best imaginable. The sitting posture is adopted as far as possible. On the left side the splenic flexure of the colon must be loosened from the diaphragm to allow of efficient drainage.

For the draining of the space below and behind the liver, including the descending portion of the duodenum, with the head of the pancreas, and up to the foramen of Winslow, the most suitable incision is an oblique or a transverse one from the point of the tenth rib towards the middle line. A roll-shaped cushion or a sand-bag should be inserted under the spinal column. If necessary, the incision is lengthened downward and backward towards the lumbar region, as previously described. From this incision one also has an excellent survey of the kidney.

By means of the same incision on the left side, one may, after having loosened the splenic flexure of the colon from the diaphragm, and having displaced the transverse colon downward to the right, and cut through the gastro-colic ligament near the colon, obtain a complete survey of the lesser sac, with the pancreas

and the posterior aspect of the stomach. The peritoneal cavity below the colon may be shut off by inserting catgut sutures between the *tænia coli* and the anterior abdominal wall. The drainage tube from the pancreas, etc., is led out through the left lumbar region. After these incisions, the patient is to be placed on the right or the left side, according to the seat of the lesion.

The oblique incision, which is mostly used for reaching the kidney, is below the twelfth rib. Better access is obtained by placing it a little higher, in the line of the eleventh intercostal nerve, and resecting the greater part of the twelfth rib. From his own experience, the author can safely recommend this incision for operations on the kidney.

In cases of acute peritonitis that have originated from the appendix, the cæcum, or the most distal part of the ileum, the most suitable method is generally to make a shorter or longer oblique incision between the eleventh and twelfth intercostal nerves, or between the twelfth intercostal and first lumbar nerves, or along Poupart's ligament and the crest of the ilium. If there is peritonitis in the whole space below the transverse colon, a similar incision must also be made on the left side.

In cases of grave peritonitis, in which it is necessary to drain round the cæcum, to make a typhlostomy, etc., one must lift up the cæcum if it be hanging down into the pelvis, and place it along the right posterior wall of the abdomen.

The author is of opinion that, even in slight cases of acute peritonitis from appendicitis, one should consider the question of plicating the cæcum if it is very much dilated, and of giving a "pelvic cæcum" a natural position in the right iliac fossa by means of a serofibrous typhlopexy.

The tampons and drains are, as a rule, led out by the lateral parts of the incision. In slighter cases one tries to close the median part of the incision, if possible, quite out to a sagittal plane through the anterior iliac spine. If this can be done, there is little risk of hernia. It is best to sew each layer separately, and with a slowly absorbed catgut (the author uses Macewen's chromic catgut [1]), and drain here and there between the muscles and apeneuroses. In cases of acute peritonitis, one should not sew the subcutaneous tissue and the skin primarily.

If it has been necessary to leave open the whole abdominal incision, or the greater part of it, a secondary suture is made as soon as possible, preferably in layers, and with chromic catgut. The incision in the skin should not be sewn until later, or silk-worm threads are inserted, and tied together afterwards.

The after-treatment.—Its object is to see that the normal functions of the intestine are regained as soon as possible, while the work of the heart and the kidneys is closely observed.

Nutrient injections and irrigations of the intestine.—Most

[1] *Brit. Med. Journ.*, London, 1904.

patients after operation get an infusion into the rectum of 500 to 1000 c.c. of saline solution, with glucose (5 to 10 per cent.), alcohol (2 to 5 per cent.), and such drugs as digitalis. Until flatus passes freely, and the patient has had an evacuation after a mild laxative, we are in the habit of irrigating the rectum, in the same way as one does with the stomach, every six to ten hours. This is rendered easier if one places a λ-shaped tube between the reservoir and the rectal tube. It is best for the mucous membrane to use a saline solution of about 1 per cent., at the body temperature. By using colder water, or adding soap, chamomile tea, and even turpentine (Lawson Tait), these irrigations are rendered more irritating, and thus in some cases more effective. After the irrigation, one may leave a certain quantity of fluid, with the addition of a larger dose of sodium chloride, Carlsbad salts, or glycerin, to work as a laxative. As a rule, we do not give such a clyster, but let the tube remain in the rectum ten to thirty minutes after the irrigation. It is often the case that the passage of flatus is greatest after the irrigation is completed. Before the rectal tube is removed, the patient gets a smaller or greater (200 to 600 c.c.) infusion into the rectum of saline (0·9 per cent.) with glucose.

With the first irrigation there often passes a good deal of fæces and flatus which were gathered in the colon before the operation; but it is only when flatus passes copiously, and the contents of the small intestine become visible, or, in other words, when the patient has another copious evacuation, that one may be quite sure the whole intestine is open and functionating. Then a mild laxative is given by the mouth, and as soon as it has acted, easily digestible food is given in small but often repeated doses.

After appendectomies, made in an early stage, and operations of a similar nature, the patient is ordered to take hot Carlsbad water already after twelve to twenty-four hours. If it turns out well, another dose is given, mostly with the addition of some bitter water or Carlsbad salts.

Influenced by the work of Lawson Tait, the author has not used the opium treatment after abdominal operations. After every abdominal incision, I have always consequently tried to make the whole alimentary canal begin its functions again as soon as possible, at the same time as water and some food (glucose) are administered through the rectum and the colon. The author has used this method since 1890, when he lost a patient, who, after a a serious gynæcological operation, got a volvulus of the small intestine, because he understood too late that there was an intestinal obstruction.

Obstructing bendings of the colon.—The intestinal peristalsis may remain in abeyance from several causes. It is not uncommon that there is formed a bending or turning in the colon, and most frequently at the splenic or hepatic flexure. Proximal to this, the

intestine becomes distended. Only now and then a single bubble of gas can pass. At last the passage is completely blocked. If both patient and surgeon have patience enough, this hindrance may generally be overcome. With this in view, an ever-increasing quantity of water is infused into the colon, until the turning or bending is at last removed. More than three litres may be necessary for this purpose. While this treatment is going on, the patient must rest alternately on his left and his right side. If a free passage in the intestine is not gained after one or two such irrigations, a Witzel's fistula is immediately made in the cæcum. It is a sure method if the operation is made early enough.

Stomach lavage.—If the patient complains of pressure and tenderness in the epigastrium, one has to examine if the stomach is distended. If that is the case, a stomach lavage is made. In case of vomiting and meteorism, stomach lavage is made at once. If paralysis of the intestine has been diagnosed, nothing is given by the mouth, but the stomach is washed out twice or thrice a day. We have succeeded in saving patients in whom we have had to wash out the stomach every day for about a week, sometimes even every second or third hour. The idea is not to allow any contents to pass into the paralysed intestine, where they would putrefy immediately. One should make it a rule to introduce a tube into the stomach for making a diagnosis as soon as intestinal paralysis is suspected.

Stomach lavage is a valuable adjunct. In case of acute dilatation of the stomach, it is indispensable. The author is, however, of opinion that an intestinal fistula, made in time in the proximal but not yet paralysed part of the small intestine, will prove a better method for pulling round a patient in cases of paralysis of the small intestine. In most cases it may be advisable to make a Witzel's fistula in the cæcum at the same time, partly in order to remove the poisonous contents from the paralysed portion of the small intestine in the shortest way, as soon as it begins to be able to transport its contents further, partly in order to furnish the body with water and food through the cæcum and the colon.

As long as the intestine is paralysed, laxatives, administered by the mouth or hypodermically, are of no use. As soon as there are signs of improvement of the paralysis, it is a rational plan to try eserine (salicylas physostigmicus) hypodermically.

On increasing the quantity of fluid in the body.—A few words are to be said on this theme. If the pulse is small, the patient gets at the operation from 1 to 2·5 litres of saline solution intravenously. If the symptoms of dilatation of the abdominal vessels continue, one increases the total quantity of fluid in the body by intravenous infusions of saline solution. One gives 1 to 2·5 litres once or twice, perhaps thrice, every twenty-four hours. One goes on with this treatment until the patient is out of danger, or as long as each intravenous infusion causes a conspicuous

reaction, that is to say, a stronger, fuller, and slower pulse, combined with an improvement in the general condition of the patient. It sometimes happens that the patient falls into a quiet sleep while the infusion is going on.

The primary object of the intravenous infusion is purely mechanical. Owing to the paresis of the splanchnic system of blood vessels, the blood accumulates in the abdominal vessels. The aim is to dilute the blood sufficiently that the vessels of other parts of the body, especially those belonging to the central nervous system and the kidneys, get a supply of blood which will suffice for the function of these organs. The paralysis of the abdominal vessels may be the chief cause of death in cases of peritoneal sepsis. The parenchymatous organs and the heart show little or no change. The thing is thus to begin in time, and go on with the intravenous infusions. It need hardly be pointed out that too much fluid may be introduced. Therefore one should incessantly control the pulse, heart, and lungs, as well as the diuresis. Take care that œdema of the lungs does not occur. It is of no use to give the artificial serum hypodermically in these cases. It is only when the circulation of the blood is so strong that one may count upon a speedy absorption of the infused fluid, and this result is attained at a first trial, that there is indication for hypodermic injections. But after that, this way is better than the intravenous one, because the fluid is more like real serum of the blood, when it is mixed with the blood.

But the addition of fluid has also other objects. It should dilute the toxins, increase the diuresis, and effect a copious secretion from the tamponed and drained serosa. There is one question that is frequently repeated—Is it possible to dilute the antitoxins too much by means of a rich supply of water? For the moment the author is of opinion that one has to observe the general condition of the patient, his heart and lungs, his urine, and the secretion from the wound. If everything confirms an improvement, or at least shows that heart and kidneys are not overstrained, one should calmly continue to give the patient 2 to 3 litres of fluid in twenty-four hours, hypodermically, per rectum, or, which is perhaps the best, *per cæcum*, if one has made a fistula in this part of the intestine, and by the mouth, as soon as this is possible. It is evident that such a patient cannot do with less water than a healthy person. Thus we should have at least 1200 to 2000 grms., if no symptoms of stasis (engorgement) appear. The circulation through the lungs must be carefully observed.

Peritoneal sepsis.—The author is of opinion one ought to offer every patient with an infection of the peritoneal cavity who is not moribund, the chance of an operation.

The thing is to *operate early*, and to give, as soon as the incision is made and while the operation is going on, 1·5 to 3

litres of artificial serum into a vein, to close the source of infection quickly, to cleanse the diseased regions of the peritoneal cavity with the utmost care, and then wash out the whole cavity. The objects are to secure a minimal absorption from the peritoneal cavity, and later a rich leucocytosis.

Food hypodermically.—The author has tried olive oil and glucose hypodermically ever since Leube's original experiments. If one injects 150 to 200 c.c. of olive oil into the tissues of a fasting person, it has an evidently favourable effect upon his condition. The author adds 3 to 8 per cent. of glucose (chemically pure from Meck) to the saline solution. One, or at most two, per cent. of alcohol is often added. These solutions are not isotonic, but the author has used them for so many years that he can safely recommend them. For many years he has given weak patients, on the day before a major operation, and, if possible, also on the morning of the operation, 500 to 1000 c.c. of saline solution with 5 to 8 per cent. of glucose, and if they are accustomed to alcohol, 1 to 2 per cent. of alcohol hypodermically (in some cases per rectum). It is evident that isotonic solutions are to be preferred for conveying nourishment to the body. If a Witzel's fistula has been made in the cæcum, one can probably do without giving food hypodermically.

After every laparotomy, one should, during the after-treatment, prescribe a diet to be carefully adhered to, and point out the importance of regular daily stools. Only mild laxatives may be given. This is of special importance after operations for acute peritonitis. Fancy how easy an adherent intestinal coil can be overstrained. Therefore, for several months, the food should be easily digestible and given at frequent intervals. It happened some time ago, in the author's clinic, that a patient who had been operated upon a month before for a widely spread purulent peritonitis of appendicular origin, was given a dish of pea-soup for dinner. He complained of colicky pain, and the abdomen became distended; irrigation of the intestine and stomach proved useless, and at ten o'clock in the evening he was placed on the table for operation. Just as the narcosis was going to begin, the patient declared that he felt better. Flatus began to pass, and he recovered without operation.

The intestine forms an organic whole. The serosa and subserosa cannot become seriously affected without the whole intestinal wall being affected. Therefore the intestines should be spared in every way a long time after the operation.

The author takes the liberty of saying a few words on the serious diarrhœas that not infrequently set in during the after-treatment, and often bring about death among people suffering from peritonitis who were already thought out of danger. The staff may have been rejoicing that the intestinal peristalsis in a desperate case had at last been brought

into action. On the following day, perhaps, or much later, an incurable diarrhœa sets in, which exhausts the last strength of the patient. Another result of the diarrhœa is, the abdomen of the patient again becomes distended; colicky pains begin anew; vomiting supervenes, and the condition merges into obstruction. The peritoneal cavity has become infected again from the enteritis by means of an infection *per continuitatem*. The patient has got a fresh, speedily migrating, acute peritonitis, which will soon result in death. In such cases one may find abscesses in the intestinal wall that have opened through the serosa, or the mucosa, or perhaps in both directions; that is to say, the enteritis ends in a peritonitis through perforation.

The administration of food subcutaneously may be of service, in cases in which diarrhœa comes on during the after-treatment. The author hopes that an emptying of the paralysed intestine by means of one or several enterostomies will prevent the occurrence of diarrhœa during the after-treatment.

Re-laparotomies.—If an encysted purulent exudation is diagnosticated, it may be emptied without delay. If the peritonitis spreads to a new region of the abdomen, one should at once consider the advisability of opening the abdomen. The symptoms of ileus may depend upon *volvulus*, or the passing of an intestinal coil under a band, etc. An early laparotomy is the only way of saving the patient. A more usual occurrence is that an intestinal coil is blocked by a sharp bending, owing to its having become adherent and fixed. It is necessary to perform an immediate re-laparotomy, if the condition does not yield to stomach lavage. If the intestine is paralysed, it is not sufficient to loosen the coil, but one should also make a fistula above the fixed part of the intestine,—if possible, in a portion that is not paralysed. If the intestines are fused together into an inextricable tangle, perhaps with abscesses between the coils, one has to consider a primary entero-anastomosis or the making of an artificial anus with secondary anastomosis.

By the efforts described above, many patients—and their number increases every year — with widely spread purulent peritonitis are saved, patients of whose recovery one could not have dreamt twenty-five years ago, when v. Mikulicz, in Billroth's clinic, for the first time sewed together a ruptured ulcer of the stomach.

The experimental and clinical work that has enabled us to obtain these results is so great, that it is nearly beyond the conception of the individual surgeon. We are under obligation to surgeons and physicians in all parts of the world, and not least to our American colleagues.

There will always be cases of widely spread, very dangerous infection of the peritoneal cavity. But in proportion as the practitioners, and, thanks to them, the public, are on the outlook

for any acute affection of the abdominal viscera, a larger number of cases of acute peritonitis will be operated upon in such an early stage of the illness that they will be restored to health, and be capable of work within four to five weeks.

Experimental and clinical work must be carried on side by side in a united fight for progress. We want a better artificial serum—for instance, one saturated with oxygen—and more certain indications for intravenous infusion. As to irrigating and draning the peritoneal cavity, there is much to investigate; but the most important question of the day is, how to remove the effects of intestinal paralysis? Another important question is, whether or not it is possible to give the body too much sodium chloride? How much of it are the kidneys able to secrete?

It is to be hoped that we shall be able to determine, in every case of acute peritonitis, which are the dangerous microbes. It is only after this problem has been solved that we can enter upon the serum question. The eventual importance of this question is evident, if we compare the results of tracheotomy for diphtheria in 1885 with O'Dwyer's intubation, and the tracheotomy in 1905 with the addition of antitoxin.

Conclusions.—1. When treating an acute peritonitis, we have to aim at—(1) An early diagnosis, which is *as rich in details as possible*; (2) early operation, if possible *before the onset of intestinal paralysis.*

2. At every operation we should try to remove the cause of the acute peritonitis.

3. In case of intestinal paralysis, we have to consider—(1) *Enterotomy* (one or several) with emptying of the intestine during the operation; (2) *typhlo-* and *enterostomies* by Witzel's method; and (3), in desperate cases, the resection of 0·5 to 1, or at most 2, metres of the paralysed intestine.

4. In cases of peritonitis caused by appendicitis, with paresis of the cæcum and the nearest portion of the ileum, one should either make a Witzel's fistula in the cæcum during the operation, or place the cæcal wall in the wound, so that one may be able to make a Witzel's fistula without narcosis, as soon as there are symptoms of intestinal paralysis after the operation.

5. In cases of recent purulent peritonitis in the centre of the abdomen (namely, round the mesentery of the small intestine), the mildest way of removing the pus is by means of irrigation with saline solution under low pressure and with free vent to the water. One must not irrigate such portions of the peritoneum as are not affected.

6. If it can be proved that the irrigation of a sound area of peritoneum with saline solution effects a leucocytosis, which prevents an infection, one would be justified, in cases of purulent peritonitis in the pelvis, to irrigate also the centre of the abdomen,

or, in cases of purulent peritonitis below the transverse colon, to irrigate above this part of the intestine.

7. Acutely inflamed peritoneal districts should be drained. This may always be performed without difficulty in the periphery of the abdomen, where it is often possible to isolate the whole infected region from the sound portion of the peritoneal cavity. The author thinks that a combined tamponing and draining with coarse cotton yarn, and drainage tubes with thin indiarubber tissue against the parietal peritoneum, is worth trying.

8. At operations for acute peritonitis an assistant should be ready to inject artificial serum into a vein. According to the author's opinion, this should be done in all cases where one has to extrude the whole small intestine from the wound.

9. During the after-treatment, one has to do everything in order that *the stomach and intestine may regain their normal functions as soon as possible.* Irrigations of the rectum, colon, and the stomach, and, if necessary, enterostomies, are old methods that have been tried and found good. A suitable subcutaneous laxative would be of great use. Concerning the effects of strychnine, eserine, and atropine upon the intestinal canal, we still know too little to lay down a fixed rule for their use. The author uses strychnine as a tonic for the heart, and thinks he has in many instances had good results from eserine in doses of from $\frac{1}{2}$ to 1 mgrm. once or twice a day, in case of intestinal paresis, or when the symptoms of intestinal paralysis have begun to abate. The mechanical methods of emptying the alimentary canal still remain the most important in the treatment of intestinal paralysis.

10. Care should be taken that the loss of liquid that the body has sustained in the earlier stages of the illness is compensated for, and that consequently a quantity of water of from 1200 to 2000 c.c. in the twenty-four hours is given in the adult. If this can be done per rectum, or through a Witzel's fistula in the cæcum, it is better than hypodermically or intravenously. The question of a larger addition of water is still under discussion. One can, however, safely increase the amount of water in all cases where the general condition of the patient and the functions of the heart are improving, and the diuresis and the secretion from the parietal peritoneum are increasing in proportion to the addition of fluid. If the paresis of the vessels belonging to the splanchnic system be regarded as the most important element in the patient's illness, one should give artificial serum, 1 to 2·5 litres, intravenously, once or twice in the twenty-four hours. The author is persuaded that such an infusion, given at the right time, may save a patient's life, and that it has often done so.

11. No other food than glucose and alcohol can with advantage be administered per rectum. Peptonised food may also be administered through fistulæ in the cæcum.

12. For some days it is possible to feed a patient hypodermic-

ally. It is an easy thing to give him, subcutaneously, during twenty-four hours, 100–200 grms. of olive oil, 160 grms. of glucose, and 40 grms. of alcohol (2 litres of saline solution, with 8 per cent. of glucose and 2 per cent. of alcohol).

13. In all cases of purulent peritonitis one has to be on the outlook for adhesions and sharp bendings of the intestine. It is important not to give food by the mouth too early. If indigestible food is given, or too great quantities of drink or liquid food are given at one time, the intestines are unable to pass this food beyond such hindrances. The result will be stagnation and distention. Therefore easily digestible food and drink should be administered in small portions, and the adhesions will in most cases be dissolved by and by.

14. After every operation for acute peritonitis, the patient should be admonished to aim at having regular stools, and not to embarrass his stomach with indigestible food.

MIGUEL SERVEDE: A FORERUNNER OF WILLIAM HARVEY.

By JOHN BRUCE, M.B., C.M.Ed., *Forres.*

IN these days of Harveian orations, perhaps you will allow me space in the columns of the Journal to briefly recall the very important part which Servetus played in the discovery of the circulation of the blood. Michael Servetus was born at Villanueva, in Aragon, in 1509. His father was a notary, and, wishing him to follow the legal profession, sent him to the University of Toulouse in order to study law. In 1530 he gave up his legal studies and went to Basle, where he devoted his attention to theology; and it was here he imbibed those opinions which were to cost him his life. The bitter attitude which John Calvin, Melanchthon, and other reformers had taken up against his religious tenets had in all probability not a little to do with his forsaking his theological studies; and so we find him, a little later, a student of medicine at the University of Lyons. He only took part of his course here, however, and finished his scientific curriculum at Paris, where he graduated in Arts as well as in Medicine. He was a successful practitioner for several years at Lyons and Vienne in Dauphiné; but by some peculiar fatalism he could not resist entering the arena of theological discussion; and so in 1553 he published his famous treatise, "Restitutio Christianismi." This caused him to be immediately arrested and imprisoned; but he managed to escape, and went to Geneva—firm in the belief that Calvin would befriend him, as in days gone by

they had carried on a long and affectionate correspondence together over disputed points of theology.

But alas for human friendship! The great Protestant reformer not only turned against him, but produced the very letters which Servetus had written him privately in connection with the above-mentioned controversy. The trial, which took place before the Council of Geneva, was a mere mockery of justice, and accordingly, on the 27th October 1553, he was slowly burned to death.

The "Restitutio Christianismi" contains a passage from which it may be inferred that its author just missed the discovery of the circulation of the blood.

In the closing years of the seventeenth century, Charles Bernard, a learned and eminent surgeon in London, informed William Wotton, "that prodigy of learning," "that one Michael Servetus, who was burned for Arianism at Geneva, had asserted in one of his treatises that the blood passes through the lungs from the left to the right ventricle, and not through the partition which divides the two ventricles." This teaching was in direct opposition to the theory of Galen, and Servetus was the first who dared to contradict such an eminent authority. His discovery may therefore be divided into two parts—(*a*) That the inter-ventricular septum is imperforate, and (*b*) that the blood passes from the left ventricle to the right by way of the lungs, and changes its colour *en route* from black to red. He was wrong in regard to the direction of the blood stream, however, and this was no doubt due to his very imperfect conception of "The Greater Circulation." But is it too much to suppose that if he had not fallen a martyr to religious bigotry at the early age of 44, that he would have forestalled Harvey, or at least have guided one or other of the three famous Paduan students—Vesalius, Colombo, or Cæsalpinus—to have done so?

In a new edition of his book, published in 1555, Vesalius asserts "that the inter-ventricular septum is imperforate." He uses the identical words of Servetus, but is most careful not to name him, as it would have been fatal to his future professional career to have given the honour of the discovery to a condemned heretic.

In 1559, Realdo Colombo published a treatise on the pulmonary circulation, and makes free use of the second of Servetus' discoveries. He quotes the exact words of the discoverer, and, probably to screen himself, adds that "No one has hitherto described this, or even hinted at it."

Vesalius and Colombo were brilliant disciples of Æsculapius, but they were not strong enough to resist the terrors of the Inquisition, and consequently withheld the honour from whom it was due. A few years later, however, Vesalius was arraigned before that august body on a charge of vivisection. He was found guilty, and had to make an expiatory pilgrimage to the Holy

Land, which he reached safely, but unfortunately was drowned on the return journey.

When Cæsalpinus noticed "that the swelling of a ligatured limb was below, and not above, the seat of constriction, it was the discovery of Servetus that enabled him to answer his own question—"How is this?" He replied, "It would be just the other way if the blood in the veins flowed from the heart to the extremities. It clearly flows through the veins to the heart, and not the other way. There it receives its final purification, and then the arteries carry it all through the body."

There can be no doubt that, had he lived in a free country, he would have completed the circulatory circuit, and the fame of the brilliant student of Fabricius ab Aquapendente would have belonged to him.

He used the term circulation, and apparently understood it; but as it was contrary to the teaching of Galen, he merely notified the discovery without any comments by way of enlargement upon it. He was a professor at Pisa, and also physician to Pope Clement the Eighth; but even this appointment could not protect him from the widespread meshes of the Inquisition, as he was arraigned before it for atheism. They could prove nothing against him, however, and once free he keeps himself above suspicion by maintaining a discreet silence in so far as Servetus was concerned. In this respect he followed the example of Vesalius and Colombo.

Harvey's work is described by Flourens as "the finest book on physiology ever written, and the great glory of it is that it says goodbye once and for all to theories and dissertations—theological, metaphysical, and scholastic,—and goes in for fact"; and herein may be recognised the value of the Baconian philosophy as contained in the "Novum Organum."

M. Charles Richet wrote an admirable treatise on Harvey, in which he says: "Bacon's book is, so to speak, the apotheosis of the experimental system. Harvey's book proves in one glorious instance its advantages." Harvey not only experimented and kept a minute record of his observations, but, living in a country where he could freely publish his works without the dread of ecclesiastical terrors, fortune seems to have been kinder to him than to Servetus. Harvey was a maker of history, and consequently his name is woven into the very warp and woof of the historical fabric, and will therefore endure as long as history itself endures.

BLOOD PRESSURE IN MAN, AND A NEW INSTRUMENT FOR RECORDING IT.[1]

SINCE the introduction in 1881 by v. Basch of an instrument for registering blood pressure clinically in man, a number of instruments have been devised for the same purpose. Erlanger, working in the Physiological Laboratory of the Johns Hopkins University, has added yet another; and in the reports of the Johns Hopkins Hospital for 1904 appears an account of his apparatus, and an exhaustive study by its use of the blood pressure in man under various physiological and pathological conditions.

With the v. Basch instrument the blood pressure is determined by the principle of Vierordt, the pressure that is required to obliterate the pulse wave in some part of the artery distal to the point of compression is ascertained, and this gives the maximum or systolic pressure in the artery. In the case of the Mosso instrument, the method of Marey is employed, the pressure which allows maximal oscillations of the arterial wall is determined, and is taken to be the minimum or diastolic pressure. V. Recklinghausen pointed out that at the moment when the extravascular pressure falls below the intravascular maximum pressure the recorded pulsations show an abrupt increase in amplitude. This phenomenon is made use of by Erlanger for ascertaining maximum pressures, the minimum pressure is also taken, and both are recorded graphically.

Erlanger's instrument is somewhat complicated in construction, but in the hands of a skilled observer would appear to give very accurate results. The brachial artery is selected for clinical observation, and a flat rubber bag enclosed in a stiff leather cover is strapped round the upper arm so as to obtain the arterial pressure as near the aorta as possible. The rubber bag is connected by a strong rubber tube to a three-way junction; one way leads to a mercury manometer with millimetre scale, and the pressures recorded are read directly; another way leads to a stiff rubber bulb enclosed in a glass bulb so as to leave an air space between them; the third way leads to a brass stop-cock, which, according to its position, communicates with a rubber inflator or with the exterior by means of one of three apertures—large, small, and minute; or the stop-cock may be so turned as to completely block the tube. Attached to the stop-cock is an indicator and dial, which shows at a glance what is being done. The space between the rubber and glass

[1] "An Experimental Study of Blood Pressure and of Pulse Pressure in Man." By Joseph Erlanger, M.D., and Donald Hooker, A.B., M.S. *Johns Hopkins Hosp. Rep.*, Baltimore, 1904, vol. xii.

bulbs communicates with a tambour which carries a style and records all movements on a revolving cylinder; a pin-hole aperture at the base of the tambour allows air to gradually pass in or out to compensate for too low or too high a pressure inside the tambour, but is too small to affect the actual pulsatory movements. Another tube leads from the air space to the brass stop-cock, and allows free exit of the air while the rubber bulb is being inflated or rapidly emptied, but during the gradual escape of air from the rubber bulb it is closed. This arrangement allows of inflation and deflation of the rubber bulb and bag round the arm without danger of too rapidly increasing or decreasing the pressure in the tambour, and so injuring it.

To ascertain the maximum pressure, the cuff is strapped on the upper arm and the bag over the brachial artery inflated till the pressure, as recorded by the Hg manometer, is above that of the artery, the writing point is arranged on the drum, which is set in motion, and then the air is allowed to gradually escape through the minute aperture in the stop-cock. The pulsations of the artery soon begin to appear, and at the moment the extravascular pressure falls below the arterial pressure the oscillations of the lever show an abrupt increase in amplitude, the pressure, as indicated at this point by the Hg manometer, is the maximum arterial pressure. To determine the minimum pressure, the air is allowed to escape further, and when the pressure in the rubber bag round the arm falls below that of the minimum arterial pressure, there is an abrupt decrease in the amplitude of pulsations which marks the point of minimum arterial pressure. A better method, however, is to select the pressure which gives the largest oscillations.

Erlanger tested the accuracy of his instrument on animals and on an artificial circulation scheme, and found it very satisfactory. He emphasises the importance of using a wide rubber bag and cuff for the brachial artery; a narrow cuff involves the loss of a considerable amount of pressure in compressing the tissues, but when the cuff exceeds 15 cms. in width this error becomes practically negligible.

The second part of the report is by Erlanger and Hooker conjointly, and deals with the blood pressure in man under various physiological conditions, such as increase of intrathoracic pressure, increase of abdominal tension and movements of the trunk, muscular exercise, changes of posture, immersion of body in water, compression of different parts of body with bandages, ingestion of food, and diurnal variations. The results obtained are discussed at length, and the paper concludes with an account of experiments on a case of orthostatic albuminuria, and a general summary of the relations between the output of urine and circulatory changes. The authors had some difficulty at first in getting consistent records of blood pressure, and it was

only by training the subjects of the experiments that they were able to get rid of irregularities in blood pressure which would have made comparative estimations difficult and unreliable.

The experiments on the case of albuminuria are very interesting; the subject was a student, æt. 27, apparently healthy in all other respects. While in the recumbent position no albumin appeared in the urine, but standing in the erect posture was followed by its appearance. Increase of intrathoracic pressure, suspension in the erect posture, either in air or in water, and muscular exertion while recumbent, failed to produce albuminuria. Muscular exertion usually increased the blood pressure and always the pulse pressure; it did not cause albumin to appear in the urine, but increased the secretion of urine unless perspiration was excessive.

Compression of the lower limbs by Criles' "pneumatic suit" prevented the appearance of albumin when the erect posture was assumed, and at the same time modified the changes in blood pressure. Albumin increased with diminution of pulse pressure, the output of albumin reaching its maximum when the pulse pressure was at its minimum.

In changing from the erect to the recumbent posture, the chief circulatory changes found were slowing of pulse rate, increase of pulse pressure, and fall of the minimum or diastolic blood pressure. The authors compare the effect of gravity in the erect posture to hæmorrhage, the vessels of the lower limbs being distended at the expense of those of the upper part of the body, compensation occurring by increased energy of the heart and increase of peripheral resistance.

The record of all the experiments performed, and the discussion on the results obtained, make a very long paper, but the work has been very thorough, and is a valuable exposition on blood pressure and its variations in man. Erlanger's sphygmomanometer certainly appears to be the most scientific instrument of the kind yet produced, and, though not so handy as Hill and Barnard's, has the advantage of recording directly in terms of millimetres of mercury, and at the same time registering changes graphically.

REVIEWS OF BRITISH AND FOREIGN LITERATURE.

A Treatise on Plague. By W. J. Simpson, M.D. (Aberd.), F.R.C.P. (Lond.), D.P.H. (Camb.). Cambridge University Press.

Everyone interested in the allied subjects of tropical medicine and epidemiology must have been frequently impressed by the need which existed for a good and standard work dealing fully with the subject of plague.

Happily that want has now been made good by the publication of Professor Simpson's treatise. The Syndics of the Cambridge University Press are to be congratulated on their choice of an author, who, by his facility and clearness of his expression, his large experience, his wide range of reading, his general knowledge of hygiene, and the fact that he is accustomed to teach, was admirably qualified to undertake the task. We have read this work with pleasure and instruction, and the only point to which possibly some small objection may be taken, is the general arrangement, which has led to considerable repetition, and has succeeded in widely separating the bacteriology of plague from its morbid anatomy and pathology. This, however, is but a slight blemish on an otherwise excellent production, and one which, at least as regards repetitions, has its advantages, for it is the most important points which recur with frequency, and they are thereby emphasised. Some might object to the absence of a complete bibliography, but the author furnishes numerous references and quotations, which in large measure atone for this omission.

The book begins with a consideration of the history and distribution of plague, three chapters being devoted to these subjects, one of which deals wholly with India. These form very interesting reading, though, had it been possible, one would have liked to hear Professor Simpson's views on the recent paper by Hankin concerning the spread of plague in our great Dependency.

The accounts of the disease in the early centuries are both graphic and instructive. The present pandemic is fully traced and discussed in a sound and impressive manner.

Part II. is concerned with the epidemiology of the disease, and here we find its bacteriology considered. The chapter on *B. pestis* is good and sufficient. Photo-micrographs are given, and a drawing of the stalactite growth in ghee bouillon. The question of the duration of the vitality and virulence of the microbe receives special attention, while due stress is laid on the difficulties of recognising the puzzling involution forms. On the subject of rat infection and the relation of epizootics to

plague, Professor Simpson speaks with no uncertain voice and with much authority. It was chiefly due to his labours in Hong Kong that plague was recognised to attack domestic and marketable animals, and some account of the experiments performed is given. The fact that chronic plague may exist in these animals is duly chronicled, and the general conclusions arrived at are tabulated.

The various views which have prevailed regarding the origin of plague are recorded, and it is disheartening, though none the less true, to be told that we remain as ignorant as our predecessors. The author points out the undoubted influence of abnormal seasons on plague prevalence, and cites the outbreaks in Hong Kong, in Bombay, and at Cape Town. Under epidemiology, modes of dissemination are described and the flea theory is discussed. Professor Simpson considers that more evidence is required to place the latter on a firm foundation. No reference is made to the possibility of the bacillus passing a definite stage in the flea, a point to which Hankin has drawn special attention. The portion devoted to "Plague in the Individual" is indeed excellent, as are the photographs illustrating buboes, but lack of space forbids any review of it in detail. The same may be said of the chapters on preventive and suppressive measures. For us it is, however, interesting to note that a very enlightened policy existed in Edinburgh as early as the sixteenth century, while in Scotland generally the methods in vogue were in advance of those in England. The use of the Clayton disinfector, both for vessels and houses, is very strongly advocated, and its advantages carefully and clearly explained. Prophylaxis and treatment are discussed at some length, and the book concludes with a summary of what is at present known (a somewhat humiliating confession), a very suggestive table showing the lines on which further inquiry is urgently needed, and a couple of useful appendices.

We think it is a pity that something was not said about the classification and geographical distribution of rats, and the beneficial part the Norway rat is supposed to play in driving out his black brother. The latter, however, is a very recent theory, and, as we have said, the treatise can be thoroughly recommended, and is indeed essential to all plague workers, medical officers of health, and students of hygiene.

The Surgical Treatment of Bright's Disease. By George M. Edebohls, M.D., LL.D. New York. New York: Frank F. Lisiecki.

Whatever credit may ultimately attach to the introduction of the treatment of chronic Bright's disease by surgical measures, Dr. G. M. Edebohls is undoubtedly entitled to a large share of it. This fact the reader of the work before us is in no danger of overlooking, as he finds it iterated and reiterated in every one of the twelve papers which constitute nearly the first half of the volume. The explanation of this somewhat irksome repetition lies in the method the author has adopted of placing his views before us, namely, that of reprinting the various contributions on the subject of decapsulation of the kidney he has made to medical literature since 1899. This method is not without its advantages from the historical point of view, but the subject has not yet

become historical. It enables us, for example, to trace the evolution of the procedure step by step, in so far at least as the process has been conducted by the author, and it brings before us such changes in opinion and modifications in technique as may have taken place during the period of its development. It has, however, the disadvantage that it involves a considerable amount of needless repetition, and to a large extent precludes the possibility of introducing a full and satisfactory exposition of the views and experience of other observers. The impression left on the mind of the reader, therefore, is that he has had one side of the argument presented to him very fully, while the other side has been imperfectly, or not at all, represented. We cannot but feel that the value of the work would have been enhanced if the author, instead of reprinting all his earlier papers, had amplified the excellent chapter on "The Surgery of Nephritis" (p. 107) in such a way as to make it a complete exposition of the whole subject from all points of view. This we are sure Dr. Edebohls was pre-eminently qualified to do, without in any way detracting from his claims to priority, or endangering his position as one of the highest authorities on the subject.

The particular method of treatment for which Dr. Edebohls enters a special plea is that of stripping the capsule from off the kidney, removing it, and replacing the kidney within its fatty capsule. The procedure is so far largely empirical, but the beneficial results which follow the operation are believed to be due to new vascular connections established between the rawed kidney substance and its surroundings. The author is inclined to discount the risk of a new fibrous capsule forming round the kidney more freely, we think, than seems justifiable.

The second half of the volume is occupied with detailed histories of seventy-two patients on whom the author has operated for chronic Bright's disease. These have been compiled with great care, and constitute a most important and valuable contribution to the literature of the subject. The results of these operations are tabulated and critically analysed. Briefly, they are these: seven patients died soon after the operation, but all were extremely ill when the operation was performed, and had probably only a few days, or at most a few weeks, expectancy of life; twenty-two patients died after the operation, but not as a result of it—of these thirteen died of chronic Bright's disease or its complications, only six of them having received no appreciable benefit from the operation; the others were all temporarily benefited by the operation. Of the patients who survived, three are unimproved, seventeen derived decided benefit, the majority being "on the high road to complete health," while seventeen are included as complete cures.

The last word has not yet been said on the value of this and other surgical operations in the treatment of chronic Bright's disease, but the work which Dr. Edebohls has done is of great importance in that it has directed the attention of surgeons to the subject, and has suggested the lines along which investigation should be carried out.

A Text-Book of Medical Practice for Practitioners and Students. Edited by WILLIAM BAIN, M.D. (Durh.), M.R.C.P. (Lond.). London: Longmans, Green, & Co.

THE appearance of yet another text-book of medicine recalls the saying, "It is strange there should be so little reading in the world and so much writing." The plea, however, which is advanced as the main justification for the appearance of another treatise on the practice of medicine, is the inclusion of articles on anatomy, histology, and physiology, prefatory to the consideration of the various groups of diseases.

A perusal of the articles constituting the volume proves the care and judgment exercised by the editor in the choice of his collaborators. In Dr. Sidney Martin's contribution we have a very good account of the diseases of the alimentary tract, though some of the methods of examining gastric contents are neither quite up to date nor free from error. Internal parasites are discussed in a concise article by Dr. C. O. Hawthorne. One of the best sections of the work is that on the diseases of the circulatory system by Dr. Wardrop Griffith; whilst the valuable contributions by Dr. Risien Russel on diseases of the nervous system, by Dr. Percy Kidd on diseases of the respiratory system, and by Dr. John Biernacki on infective diseases of temperate climes, do much to enhance the value of the treatise.

Among the briefer contributions are those by Dr. A. E. Russel on diseases of the blood and spleen, by the Editor on diseases of the ductless glands and on gout, by Dr. W. P. Herringham on diseases of the kidneys, by Dr. A. Whitefield on skin diseases, and by Dr. C. W. Daniels on tropical diseases.

The text is throughout carefully and well written, there is an excellent index, and the work may be pronounced one of the best of recent text-books of medicine. The majority of the seventy-five illustrations are borrowed from other works, but some of the figures are lacking in definition.

Tuberculosis and Acute General Miliary Tuberculosis. By Prof. G. CORNET. Edited by WALTER B. JAMES, M.D., New York. Authorised translation from German under the editorial supervision of ALFRED STENGEL, M.D. Philadelphia, New York, and London: W. B. Saunders & Company.

PROFESSOR CORNET'S treatise on tuberculosis is the most comprehensive and exhaustive work dealing with the clinical as well as the pathological aspect of the subject which has appeared in the English language up to the present time. The work may be described as essentially Teutonic in character, solid and ponderous, lacking the fascination of the great French treatise of Straus, but withal containing a large mass of information, and embodying the latest researches and observations on tuberculosis.

The English translation has been well executed under the editorial supervision of Dr. Alfred Stengel. No alterations from the original text have been made by the American editor, Dr. Walter B. James.

Additions are limited to topics which have developed or in which there has been progress or increase of knowledge since the appearance of the work in German, such as the question of the relations of human and bovine tuberculosis and the subject of artificial immunity. The editor, moreover, has refrained from discussing or criticising any views held by the author, thinking it better to present the work to the medical profession as it was written.

A special chapter upon the chemistry of the tubercle bacillus, from the pen of Dr. E. R. Baldwin of Saranac Lake, has been introduced, forming a useful addition to the section on bacteriology. Professor Cornet throughout the work displays critical acumen and sound judgment in dealing with the theories and views of various workers, and when he differs from them gives good reasons for his own opinions.

The modes of invasion of the tubercle bacillus are very fully considered. It may be noted that Professor Cornet favours the view that tuberculosis of the genital organs has an exogenous origin, and further considers that tuberculosis of the uropoietic system is usually secondary to and dependent upon a genital tuberculosis. The reasons he gives for his belief are fairly convincing, although somewhat startling, and whether the exogenous origin is the common one or not, it is highly important to bear in mind its possibility.

One of the most interesting chapters in the book is that on infection, with regard to which Professor Cornet's own experiments and observations have been of great value. Dr. Cornet draws attention to certain widespread misconceptions concerning the proportion of consumptive individuals in the population. Because one in every seven deaths is due to tuberculosis, it has been argued that tuberculosis affects a third of the whole race, whereas probably the proportion is not more than one per cent. Another fallacy, which perhaps is even more general, is that the age at which tuberculosis is most prevalent is between 20 and 40. It is graphically shown how the mortality steadily increases up to the age period 60 to 70, after which it declines again.

In another chapter the subject of heredity is discussed at great, we might almost say unnecessary, length. The former ideas as to heredity have been generally modified, and few, we presume, will be found at the present day to maintain that tuberculosis is actually an inherited disease. That certain families show special susceptibility and lessened resistance to tuberculosis is, however, a matter of common knowledge. We venture to think that such predisposition counts for more than Professor Cornet is prepared to admit.

The pathological anatomy of pulmonary tuberculosis is comparatively briefly considered, but is clearly described. This chapter is followed by a detailed and faithful account of the symptoms, physical signs, course, and complications of the disease. More space might, however, have been given with advantage to a description of the different types of the disease, especially to the form commonly known as galloping consumption or acute pneumonic phthisis.

The chapter on prophylaxis in pulmonary tuberculosis is an excellent summary of what can be done by individuals and by the State to prevent the spread of tuberculosis. We note that Professor Cornet does not consider that Flugge's spray theory of infection by minute particles

thrown out by coughing has much practical value. He maintains, as the result of prolonged observation and experiment, that very few bacilli escape into the air as the direct result of coughing, and holds to the older teaching that dried expectoration is the main source of infection. The results in the diminished prevalence of tuberculosis which have followed measures of prevention in Prussia are most gratifying as regards the present, and most encouraging for the future.

The chapter on treatment is full. What is said on the subject is judicious, and we can for the most part endorse the author's views. By an unfortunate misprint, the author is represented as saying that "hygiene and die are the chief factors in the treatment," but his meaning is obvious. While we have a high opinion of the value of sanatorium treatment, we agree that there is no foundation for the narrow conception that it is the only means of cure for consumption. For certain cases sanatorium treatment is undoubtedly the best, but it is a mistake to overrate it, or to claim, as we noticed was done in a recent sanatorium prospectus, that it provides "the only treatment for their disease which offers any chance of permanent restoration to health." The details as to hygienic and dietetic treatment are eminently practical.

The volume concludes with an account of acute general miliary tuberculosis. The author takes, we think, too pessimistic a view of this disease, and makes only a passing reference to what must be considered a most valuable means of treatment, namely, lumbar puncture.

A voluminous bibliography, extending to eighty-three pages, deals with the comparatively recent ephemeral literature of the subject, for the most part German. Few and far between there may be found references to articles in British and American journals. For the majority of English readers a bibliography of this kind is of little practical value. The value of the bibliography is diminished by the fact that no general alphabetical index of authors' names is given. The general index is complete and carefully prepared, and we have found it perfectly satisfactory for reference.

New Methods of Treatment. By Dr. Laumonier. Translated by H. W. Syers, M.A., M.D.Cantab. London: A. Constable & Co. Ltd.

This is the English translation of the second edition of an excellent little French book. The first edition met with such immediate success that it was exhausted in a few months. The English translation has been well done. The object of the book is clearly stated in the Preface. It is an attempt to put the essential facts which form the basis of the newer therapeutic measures within the easy reach of the practitioner. As Dr. Laumonier points out, the busy practitioner is often unable to keep up with all the advances made in therapeutics. He is often at a loss, when questioned by a patient about the latest fashion in therapeutics. Even if he does use new drugs, he is ignorant of the principles on which their action is based. To remedy this, Dr. Laumonier's book claims to give clear, definite, and complete information about such new drugs and methods as are already sufficiently well known and established to enable one to write authori-

tatively about them. The plan of the work is good. The drugs, etc., are arranged in groups under such titles as "Nerve Alterants," "Nutritive Alterants," "Blood Alterants," etc. Each chapter commences with an interesting summary of the pathological physiology and pathogeny of the conditions to be treated.

Medical Electricity. By LEWIS JONES, M.A., M.D. Fourth Edition. London: H. K. Lewis.

THE fourth edition of Dr. Lewis Jones' book will enhance the credit due to the author for providing what is probably the best guide in the language to the medical applications of electricity. The general reader will naturally turn with interest to learn the verdict of the writer on the value of the newer methods of electrical treatment—high frequency currents, X-rays, and radium. As regards the first of these, Dr. Jones is definitely of opinion that, while it is of decided value as a therapeutic method, it is at present being overdone in this country; and his strictures on its indiscriminate use, or rather abuse, in all sorts of maladies, by unqualified persons, "syndicates," "institutes," *et hoc genus omne*, will find an echo of approval in the profession. In diseases depending on perversions of nutrition (where good results were anticipated), not much has yet been accomplished by high frequency currents; the same applies to most nervous diseases. On the other hand, benefit has accrued in certain skin diseases, and the results in pulmonary tuberculosis warrant further investigation. The most definite benefits, however, seem to have been obtained in some rectal diseases, such as piles and fissure, and in lupus. Under X-rays little reference is made to the quite recent and remarkable results (none the less striking that they are unfortunately temporary) attained by their use in leukæmia. Besides a full account of the different forms of electrical apparatus, this manual gives such minute and detailed instructions as to how they should be used as ought to promote the intelligent application of electrical treatment generally, and check the somewhat haphazard manner in which it is too often employed.

NOTES ON BOOKS.

Dr. M'Call Anderson reprints, under the title *A Plea for the More General Use of Tuberculin by the Profession* (Glasgow: James MacLehose & Sons), an address delivered before the Dermatological Society. He urges the use of tuberculin for both diagnostic and therapeutic purposes. The injections begin at 0·25 or 0·5 c.c. of 1 in 1000 OT, and may rise to 1 c.c. of pure tuberculin. He regards the tuberculin as "ferreting out and destroying" even unsuspected foci of disease in all parts of the body. It is especially valuable in skin conditions, but cases of deeper tuberculosis, *e.g.* Addison's disease, improved markedly under this treatment.

A Reference Hand-Book for Nurses, by Amanda K. Beck (Philadelphia and London: W. B. Saunders & Co.), is written by a nurse, and includes articles by superintending nurses and by physicians. It contains the action and dosage of the more important drugs, various useful formulæ, the preparations for an operation, the symptoms and treatment of some of the common diseases, besides articles on sick-room cookery, obstetrics, massage, electricity, and other subjects. The book, while containing much information, is of a convenient size for the pocket, and should fulfil the object indicated by its title.

Modern Dietetics in the Causation of Disease, by J. Sim Wallace, M.D., D.Sc., L.D.S. (London: Baillière, Tindall, & Cox), is an uncompromising attack upon our choice of food, especially that for children. The great increase in such diseases as dental caries, adenoids, and gastric and intestinal derangements, including appendicitis, he attributes to errors of diet. Arguing from the date of eruption of the temporary teeth, he believes that food requiring mastication should largely take the place of milk and sops in the physiological diet of the young child. The excessive preparation and refinement of adults' food remove the fibrous substances which, while *chemically* inert, play an important rôle, by enforcing thorough mastication and supplying a stimulus to intestinal peristalsis. The author's views are well worthy of careful consideration.

A translation of *Muco-membranous Enterocolitis*, a little volume of 66 pages, by Paul Froussard, M.D., is edited by Dr. Edward Blake (London: Henry J. Glaisher). The condition is characterised by three symptoms—*constipation*, sometimes with temporary attacks of diarrhœa; *pain*, often paroxysmal; and discharge of *mucus* per anum. The author regards the condition as one of hyper-excitability of the intestinal nerve centres, whereby slight causes may set up spasm of the intestine, frequently followed by atony. He also gives his views on the differential diagnosis and treatment.

The Book of Prescriptions (Beasley), re-written by E. W. Lucas, F.I.C., F.C.S. (London: J. & A. Churchill), is now in its eighth edition. It gives in alphabetical order the various drugs, with their commonest preparations, their dosage and action. Typical prescriptions are added in each case. There is also an alphabetical list of common diseases, with their remedies. The book is well up to date, and contains the modern synthetic substances. One might suggest that pharmacopœial preparations should be indicated by the addition of the letters "B.P."

Meals Medicinal, with "Herbal Simples" (of Edible parts), "Curative Foods from the Cook, in place of Drugs from the Chemist," is the title of a work by Dr. W. T. Fernie (John Wright & Co., Bristol, 1905). It is dedicated "To Our Little Marys (playfully named), with the homage of a lifetime spent in their service," and is a book which defies at once classification, analysis, or criticism. Within its 780 pages the reader will find, in prose or verse, information, more or less useful and reliable, on everything edible, or related to what is edible, from willow-pattern plates to sheep's head, which latter dish the work closely resembles in being "fine confused feeding." As Scotsmen, however, we must protest against one notable omission, no reference being made to the "great chieftain o' the puddin' race," or what's intilt.

A useful little monograph has been written by Dr. A. Combe of Lausanne. It is entitled *Traitement de l'Entérite Muco-membraneuse* (J. B. Baillière et fils, Paris, 1905), and deals in an essentially practical way with this common affection.

The second edition of Dr. Edward Blake's *Intestinal Catarrhs* (Henry J. Glaisher, London, 1905), which is before us, is to all intents and purposes a new book. A section on sprue has been added, and the treatment of the various forms of catarrh is fully discussed. The full bibliography added to each chapter greatly enhances the value of the book as a work of reference.

The first fasciculus of a new French treatise on medicine and therapeutics, to be published under the direction of Brouardel & Gilbert (J. B. Baillière et fils, Paris, 1905), comes from the pen of Professor Paul Carnot of Paris. It deals with *Maladies microbiennes en général*, and furnishes an excellent treatise on the subject. The subject of immunity is fully and clearly discussed in all its bearings. The work is planned on a large scale, and promises to be a valuable addition to the literature of practical medicine.

A melancholy interest attaches to the *Autobiography of Mr. Frederick James Gant, F.R.C.S.* (Baillière, London, 1905), as the author has only survived its publication by a few months. It is the record of a busy and strenuous life, guided by high ideals, most of which the writer had the satisfaction of seeing realised in his lifetime.

The fourth volume of the fourteenth series of *International Clinics* (J. B. Lippincott Company, Philadelphia and London, 1905) contains a series of papers of that high standard we are accustomed to find in this excellent publication.

In his *Clinical Lectures on Appendicitis, Radical Cure of Inguinal Hernia, and Perforating Gastric Ulcer* (Baillière, Tindall, & Cox, London, 1905), Mr. Turner analyses the results of his operative work at St. George's Hospital over a number of years. He deals with 140 cases of appendicitis, 200 cases of hernia, and nine cases of perforating gastric ulcer. He is an advocate of early operation in cases of acute appendicitis, and the results he shows fully justify the position he takes up. His record of nine operations for perforated gastric ulcer with eight recoveries is an exceptionally good one, and illustrates well the success attending early operation with thorough washing out of the peritoneal cavity in these cases. The lectures are a record of excellent practical work, and will be profitably read by surgeons and others interested in the subjects dealt with.

Dr. Moorhead's *Surface Anatomy* (Baillière, Tindall, & Cox, London, 1905) represents the lectures which he is accustomed to deliver on surface anatomy, dealing with bony landmarks, the outlines of prominent muscles, the lines indicating on the skin the course of main vessels and nerves, and the organs and viscera of the body. He has compiled from standard works on anatomy and surgery the bare facts of his subject, and arranged them in the order usually followed in similar text-books, without attempting to illustrate their importance by any reference to their clinical application in cases of injury or disease. The result is a somewhat dry narrative, but the information given is accurate and clearly expressed. The illustrations are numerous and good, but a few inaccuracies have passed unnoticed, which should be corrected in future editions. Thus in Figs. 1 and 2 the sutures of the occipital and temporal bones are wrongly drawn; in Fig. 10 the lower pole of the left kidney is placed at a lower level than that at which it is said to lie in the text; and in Fig. 11 the vertebra prominens is described as the first cervical vertebra. The book may be commended to students as an accurate guide when studying surface anatomy on the living model.

Dr. Hanke's manual of *The Treatment of Diseases of the Eye* (Hodder & Stoughton, London, 1905) is intended to serve as an up-to-date guide to the general practitioner in his treatment of eye diseases. It presents a full, though necessarily condensed, summary of modern ocular therapeutics, combined with notes on important diagnostic points, while detailed descriptions of operative methods are omitted, since these would not enable the inexperienced to undertake work which can only be efficiently done by the specialist. The manual will prove of interest in this country, we imagine, chiefly to ophthalmologists, as indicating the lines of treatment followed in Professor Fuchs' clinic, where Dr. Hanke is first assistant. Many of the methods and drugs recommended are still on their trial, and for this reason alone the book

seems to us unsuited for the general practitioner, whose limited opportunities of treating eye diseases do not permit of his experimenting with novelties. The translators have given an admirably clear and readable version of Dr. Hanke's work.

This little work (*Manuel de la Prostatectomie Périnéale*, by Robert Proust. Paris: C. Naud) is a useful contribution to the much debated question as to the best method of performing prostatectomy for senile enlargement. The author, following the example of Alexander, Parker Syms, and Albarran, shows himself to be an enthusiastic supporter of the perineal route. The manual is nicely written and well illustrated. It is dedicated to Guyon in a few graceful sentences, such as we are accustomed to admire in French authors.

This book (*Tumours, Innocent and Malignant*, by J. Bland-Sutton. London: Cassell & Co. Ltd.) is so widely known and appreciated that the appearance of a third edition merely calls for a renewed expression of our opinion of its great teaching value. Mr. Bland-Sutton has the rare merit of rendering the pathology of tumours attractive reading, and of imparting knowledge in such a way that it is readily available for clinical use. In the present edition, the phrase "squamous celled cancer" replaces epithelioma, the myelomata are—somewhat late in the day—rescued from the "banal society of the sarcomata," and new sections have been written on uterine decidnoma and primary cancer of the Fallopian tube. The illustrations are, as before, a striking and valuable feature of the book.

Dr. Dawson Turner has given us an exceedingly good book upon "Practical Medical Electricity" (London: Baillière) which has now reached its fourth edition. The work has been carefully revised, thirty new illustrations added, and its value thereby increased. The work is already so well known, and its author has so great a name on the subject upon which he writes, that it is no wonder the book has proved such a success.

One hardly needs to refer to the earlier parts of the volume, being as they are very much what they were before; they offer, however, a most excellent means for the student, medical or otherwise, of learning the elementary tenets of electrical science. The new volume also contains some very excellent notes about the treatment of tubercular disease of the skin by means of Dr. Finsen's light treatment in its various forms. Other additions concern radiation from radium in the treatment of malignant disease, and the use of high frequency currents.

Dr. Beck's contribution to the diagnosis and treatment of disease by means of the X Rays (*Roentgen Ray Diagnosis and Therapy*. London: Appleton), with 322 illustrations in the text, is an illustration of how far painstaking research along one line may be extended. The chief interest in the volume, we must confess, lies in its numerous illustrations, whether they be diagrammatic or photographic—perhaps we ought to say skiagraphic.

A considerable portion of the book is devoted to the consideration

of X-Ray dermatitis. A most interesting photograph is shown on p. 370 of the hand of a Röntgen-Ray physician, the skin all wrinkled, and the nails shrivelled.

Another book on the same subject, *Elements of General Radio-Therapy*, by Freund of Vienna (London: Rebman), has been very well translated by Dr. Lancashire, appropriately domiciled in Manchester. It is a much more theoretical book than the others, is much less freely illustrated, while what illustrations there are are almost entirely diagrammatic. In fact, it is a book which requires very careful reading. There is, in fact, a great similarity between the three books noticed above, but only in their view of the application of electricity in its various forms in medicine, for No. 1 and No. 3 are more technical, while No. 2 is more emblematical.

Without professing originality, Dr. Bedford has done more than merely compile an addition to the list of works on urine testing (*Clinical Handbook of Urine Analysis.* Edinburgh: Bell & Bradfute) already existing. He writes with the authority born of a practical acquaintance with methods, and exercises discrimination in excluding tests beyond the capacity of those not specially trained in analysis. The book is essentially one for a ward sideroom, and in it will be found, given with such detail as should render error impossible, all the tests likely to be required even in advanced clinical work. The only addition to the three ordinary tests for albumin which Dr. Bedford recommends is Tancret's reagent, while for sugar he advises the saffranin test. A list of tests for drugs in the urine, and an account of the newer tests of renal activity, are given. The section on cryoscopy is scarcely adequate, but except for this the book demands unreserved praise. The illustrations are for the most part original.

The fourth volume of these Reports (*Reports of the Society for the Study of Disease in Children.* London: J. & A. Churchill) will bear favourable comparison with its predecessors, and it shows that the Society of which it is the mouthpiece continues to fill a long-felt want, and that its proceedings are characterised by a high standard of excellence. Quite the most important and valuable contribution in the present number is a paper on "Delayed Chloroform Poisoning," by Mr. Stiles and Dr. Stuart M'Donald of Edinburgh, in which, after reviewing the literature of the subject and discussing the various theories regarding the cause of death, they give an account of several cases and of the post-mortem findings.

As the result of their elaborate investigations, they conclude that chloroform is an intense protoplasmic poison, capable of producing changes in the organs seriously interfering with their functions. The most prominent histological change is a fatty involvement of the liver, heart, kidneys, and possibly of other organs. They take the view that the condition is brought about by some obscure form of intoxication. Interesting papers on hypertrophic stenosis of the pylorus, with accounts of cases, are contributed by Dent, Cautley, and Morrison, but the space at our disposal only permits us to mention them, and to remark that they are well worthy of perusal.

RECENT ADVANCES IN MEDICAL SCIENCE.

MEDICINE.

UNDER THE CHARGE OF

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Diseases of the Bony Skeleton.

Osteogenesis Imperfecta.—This malady, one of the two main types of fœtal bone disease (achondroplasia being the other), has generally been regarded as incompatible with extra-uterine life, and has therefore been studied chiefly by teratologists; but two papers have recently appeared which quite conclusively show that this is not so, and that not only may sufferers from the disease survive, but that the condition is easily recognisable clinically. Nathan (*Am. Journ. Med. Sc.*, Phila., 1905, January) holds that idiopathic fragilitas ossium (osteopsathysosis) is synonymous with osteogenesis imperfecta, and the fact that the identity of the cases has not been recognised is due to the circumstance that they have not been seen (or at least not accurately described) at the time of birth. In osteogenesis imperfecta, as seen in still-born fœtuses, there are found multiple fractures in various stages of union, along with an imperfect ossification of the cranial vault. The callus formation in fractures of the ribs gives rise to spurious beading, hence such cases have been mistaken for fœtal rickets. Pathologically, the lesion is a defective ossification of the diaphyses and bones of the vault of the skull; the epiphyses and cranial base are normal—exactly the opposite of what obtains in achondroplasia. Nathan describes the case of an infant who at birth had this same membranous condition of the skull, and sustained fractures on very slight violence. Twelve such fractures occurred within the first four years of life. In all respects the case resembled fragilitas ossium—complete (not greenstick) fractures on slight violence, ready union, and the formation of much callus. The association of these with the characteristic membranous condition of the skull brings the case into line with the osteogenesis imperfecta of the teratologist, and there seems no reason to doubt the correctness of Nathan's contention that, while if the disease is severe it proves fatal before or at birth, the slighter cases survive, are unrecognised until numerous fractures have occurred and the head has become fully ossified, and therefore have been classified independently as fragilitas ossium. Hohlfeld (*München. med. Wchnschr.*, 1905, February 14) takes the same view, describing a case of osteogenesis

imperfecta, the special interest of which is, he says, the fact that the patient was not still-born, but lived. The infant was born with the membranous condition of the posterior part of the cranial vault already mentioned, and in addition (unlike Nathan's case, in which all the fractures were post-natal) had fractures, some recent, and some old, of both humeri, the right radius, the left clavicle, and both thigh bones. The epiphyses were normal. During the first four months three further fractures occurred, all without injury, but despite these the child thrives, and the cranium is becoming consolidated.

Multiple Myeloma (*Kahler's disease*).—In view of the now generally received opinion that the presence of Bence-Jones' albumose is pathognomonic of multiple myeloma, and that reports of the disease in which that body is said to have been absent from the urine should be regarded as doubtful, Collins' contribution (*Med. Rec.*, N. Y., 1905, April 29) is of value, in that it proves that multiple myeloma occurs without Bence-Jones' albumosuria—a point of considerable clinical importance, especially when vouched for by so reliable an observer as the writer of the paper. His patient was a man, æt. 56, an alcoholic and old syphilitic, who was under observation for the following symptoms for nearly two years:—Continuous excruciating dull pain all over the body, not worst at night, but greatly intensified by movement or handling; hyperæsthesia of the legs; incontinence of urine; emaciation. Physical examination showed little except cachexia, a systolic bruit, slight enlargement of the superficial glands, and tenderness, but no irregularity of the bones. The urine contained a few hyaline casts at times, but never albumose; a trace of albumin was found only towards the end of life. Examination of the blood showed deficiency of hæmoglobin, a normal leucocyte count, and 1 per cent. of neutrophile myelocytes. During life the case was regarded as probably multiple myeloma, notwithstanding the absence of Bence-Jones' albumose, and on post-mortem examination this was confirmed, there being, in addition to chronic interstitial changes in most of the viscera, a characteristic lesion of the bones. This consisted in a diffuse round-celled growth infiltrating and destroying the true bone; in parts the new growth presented an alveolar arrangement, containing spaces lined by endothelium, there being also an attempt at the formation of blood vessels. The marrow as well as the bone was involved by the neoplasm. The noteworthy clinical features are—(1) The absence of alteration in the contour of the bones during life. (2) Despite extensive rarefying osteitis, there were no signs of past or present fracture or dislocation. (3) Absence from the urine of the Bence-Jones' proteid.

The symptomatology of "Carcinosis of the Skeleton" is discussed by Karl Petrén (*Mitth. a. d. Grenzgeb. d. Med. u. Chir.*, Jena, 1905, Bd. xiv. Heft 4) on the basis of a series of cases observed by him. The grosser symptoms of cancerous metastases in the skeleton—fracture, deformity, and compression of the spinal cord—are well known, cancer of the vertebræ having been especially studied by Bruns and others. Petrén is concerned with the symptoms of malignant disease of the spine and pelvis in cases in which no evidence of compression of the cord is manifest. He shows that cancer of the vertebral column often causes symptoms referable to this structure only, the chief of these being *pain*,

variable in severity, and capricious in its changes of position. This ever-altering seat of the pain is apt to suggest a functional origin, but where there is a previous history of cancer of the breast, etc., it points strongly to metastasis to the skeleton having taken place. Tenderness over the bones is not constant. Another important symptom is inability to walk, unassociated with paralysis, and not, apparently, dependent on pain. Metastasis to the pelvic bones may show itself by deformity, but before this occurs it is possible to detect a sort of indistinctness in the contour of the iliac bones, which seem softer and less well defined than normal. The main conclusion drawn in the paper is that when a patient, after having had a carcinoma extirpated, begins to complain of pain in the body or limbs, for which no definite objective cause can be detected, and when the pain, while persisting, varies a good deal in intensity and site, cancer of the skeleton should be suspected; the suspicion becomes a certainty if the pain is increased by movement and if walking becomes difficult.

Recent Work on Urinary and Renal Diseases.

The "Œdema of Kidney Disease" is the subject of papers by Kovesi and Rothschultz (*Wien. klin. Wchnschr.*, 1904, October 13) and Dougherty (*Med. Rec.*, N. Y., 1904, October 22). The former deals with the two conflicting theories on the cause of œdema—(1) That it is due to insufficient excretion by the kidney (Bartels), and (2) that it is caused by morbidly exalted permeability of the capillaries (Cohnheim). The authors attempt to fill up the lacunæ of Bartels' hypothesis,—namely, the lack of evidence that the diminished excretion of water is primarily due to renal insufficiency, and the neglect of the other factors (extra-urinary excretion and diminished intake) which maintain the watery equilibrium of the body. Koranyi's work on cryoscopy affords a new means of investigating the true nature of dropsy; he has shown that in nephritis the kidneys cannot excrete a urine the concentration of which is low as compared with that of the blood serum, while at the same time their permeability for dissolved molecules is small. The total quantity of urine secreted is therefore low, because the comparatively small number of dissolved molecules which can pass through the kidney cannot be excreted in very diluted urine. Thus we have the nephritis resulting in oliguria on the one hand and the retention of molecules on the other. Retention of molecules by causing increased osmotic pressure leads to polydipsia and lessens the insensible transpiration of fluid by the skin, etc. Kovesi and Rothschultz have made a number of cryoscopic and metabolic experiments on patients suffering from renal disease, with the following results. The prime cause of œdema is the defective water-excreting power of the kidneys, and Cohnheim's opinion that the secretion of urine depends on and is secondary to the extent of the dropsy is shown to be wrong. This is proved by "dilution experiments"—the giving healthy persons and patients with kidney disease large quantities of water to drink, which is followed in the former case by free diuresis, the urine being of low concentration, while in the latter the diuresis and dilution are much less, or even absent. Now it is impossible that the absence of diuresis and dilution is anything but primary,—*e.g.*, that it is

due to some fault in the absorption of water by the tissues,—for two reasons, first, because it occurs when there is not the slightest sign of dropsy; and, secondly, because in nephritis, both after such dilution experiments and after analogous procedures which normally cause variations in the concentration of the urine, the freezing point remains absolutely constant. In parenchymatous nephritis the diminution in the power of excreting a highly dilute urine is evident before œdema develops, and in bad cases the steadiness with which the concentration remains stationary at a fixed level, in spite of vapour baths, purges, copious drinking of water, etc., is very remarkable. In other words, all power of accommodation, either to varying molecular concentration or quantity of water, is absolutely lost. The result of this diminished elimination of water must lead to its retention in the body, unless compensated for by vicarious excretion or diminished intake. That the intake is not lessened, however, we know, and it has been experimentally proved that the excretion by the lungs and skin is scanty,—the reason being, according to Koranyi, the high osmotic tension, just as saline solutions evaporate with increasing difficulty in proportion to their concentration. Thus it is found that by giving quantities of salt to patients whose kidneys are diseased, the œdema is increased more rapidly than by giving similar quantities of food and water, but restricting the salt. The final result of the water retention is hydræmic plethora, which precedes œdema. In the concluding part of the paper cardiac dropsy is briefly considered. It is ascribed to exactly the same series of events as renal dropsy—insufficient excretion of water by the kidneys and hydræmic plethora. The renal inadequacy caused by the heart lesion produces undue fulness of the vessels, recent investigations having shown that, although in cardiac failure there may be hyperglobulia, the blood serum is always more watery than normal. In cardiac disease, however, one circumstance tending to hinder dropsy is present, namely, the slowness of the circulation not favouring the absorption of fluid from the digestive tract.

Dougherty, writing on the "Pathogenesis and Treatment of Œdema," follows on the lines of the preceding article. The fact that slight and extensive renal disease may equally be accompanied by extreme dropsy, was inexplicable until the rôle played by sodium chloride in maintaining osmotic equilibrium was elucidated. It has now been shown that œdema is due to the retention of sodium chloride [therefore arising directly from the inability of the kidney to excrete water], and there is a prospect that aid in the prognosis of Bright's disease may be gained from noticing the eliminating power of the kidneys after the administration of measured quantities of sodium chloride. Such observations have naturally led to the treatment of œdema by a salt-free diet, and this has met with a fair measure of success, as in two cases detailed by Dougherty. Reduction of the amount of the salt taken was followed by free diuresis, since the watery elements coursing through the kidney were no longer overcharged with NaCl, and therefore more easily excreted than formerly. [The diseased kidneys, as stated above, are unable to excrete a urine of a molecular concentration much lower than that of the blood serum; when the concentration of the blood is diminished by limiting the saline molecules in the food, this difficulty is overcome, hence the diuresis.]

SURGERY.

UNDER THE CHARGE OF

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Renal Tumours.

Most of the recent literature on the surgery of the kidney has dealt with new methods of diagnosis in kidney affections, and with the operative treatment of renal tuberculosis. Comparatively little has been written on the surgery of renal tumours, and Kronlein's record of all his cases of tumour of the kidney (*Cor.-Bl. f. schweiz. Aerzte*, Basel, 1905, July 1) forms an interesting contribution to the subject. He has met with twenty-three cases in all. In three no operation was possible, while in twenty nephrectomy was done. Seventeen of the patients were men, six women, the numbers contrasting markedly with those in tuberculous cases, in which the proportion of women to men is nearly three to one. The ages varied from 19 to 69. Of the twenty tumours removed, one was a sarcoma, one a polycystic tumour, one a teratoid, while eight were found to be carcinoma, nine hypernephroma.

Kronlein expresses no positive opinion on the histogenesis of hypernephroma or on its malignancy or the reverse, although he believes that no one now differs from the original view put forward by Grawitz that hypernephroma is the result of the growth of misplaced suprarenal cell elements. In one of his cases the tumours had existed for twenty-five years before removal, and the patient is now alive and well three years after the operation, thus indicating that the tumour was simple in nature. In another case the patient remained well for eleven years after operation, and then local recurrence appeared, which ultimately proved fatal. Five of the hypernephromata were without doubt malignant, for all the patients died soon after operation, with local recurrence and metastases in heart, lungs, bones, etc.

In discussing the symptoms of renal tumours, Kronlein lays great stress on hæmaturia, as being the earliest symptom to attract attention. It may be slight, irregular, and variable in amount, but is, apart from the presence of a recognisable tumour, often the only symptom in the early stage of a case when operation may be carried out with a prospect of success.

Kronlein always uses the lumbar incision, removing the kidney by the extra peritoneal route whenever possible. A general analysis of the results of operation in the twenty cases shows that one patient died of peritonitis, eleven died of recurrence of carcinoma or hypernephroma, two died of some other disease after recovery from the kidney condition, five were alive at periods varying from two to twenty years after operation, and one patient could not be traced.

Acetonuria in Non-Diabetic Surgical Cases.

From the observations made by Hubbard (*Boston Med. and S. Journ.*, 1905, June 29) it would appear that acetonuria is a much more common condition in surgical cases than is at present realised. Routine examination of the urine for acetone and diacetic acid, undertaken by Hubbard, disclosed that these substances were present in many cases in which no symptoms arose to indicate that the course of the disease under consideration deviated in any way from the normal.

In nine cases out of 145 examined, this symptomless acetonuria was found. These included cases of tuberculous glands in the neck, cerebral concussion, appendix abscess, simple fracture, etc. The acetonuria was not due to the administration of an anæsthetic, for all cases were examined before any anæsthetic was given.

In another group of cases, acetonuria was found in searching for the cause of some abnormality in convalescence. Five such cases are reported, and in all the condition yielded readily to treatment with sodium bicarbonate.

Finally, in two cases, acetonuria appeared along with grave symptoms, and death occurred. It is to be noted that in none of the cases examined was sugar found in the urine.

As the result of his observations, Hubbard concludes that—(1) Acetonuria is of more frequent occurrence than is commonly supposed; (2) its presence without symptoms has no effect on operative treatment or prognosis; (3) its presence with moderate symptoms is of only slight importance; (4) its presence with severe symptoms is of the gravest prognostic value; (5) the most common symptom is the occurrence of vomiting without apparent cause; sometimes the characteristic odour is present in the breath, but not always.

Thyroidectomy for Exophthalmic Goitre.

Hartley (*Ann. Surg.*, St. Louis, 1905, July) reports a series of fifteen cases of exophthalmic goitre treated by partial thyroidectomy, with marked success. His cases are of special interest, because many of them were seen years after operation, and the good results were found to have been permanent. One of his fifteen cases died suddenly during the operation; in the other fourteen, very marked improvement, amounting practically to cure, took place, for all the patients regained good health, were able to resume their occupations, and were free from anxiety and nervousness. In all the muscular tremor disappeared, and in all but three the exophthalmos also subsided. In these three, however, the eyes were easily covered by the lids, and there was no feeling of distension such as the patients felt before operation.

Hartley believes that these results were due to sufficient gland substance having been removed, and supports this contention by referring to five cases reported by Mikulicz and Schulz, in which recurrence of symptoms was cured by a second operation for the removal of more of the substance of the thyroid gland.

All Hartley's patients were operated on under a general anæsthetic, gas and ether, and he has not yet seen a case where he considered that

a local anæsthetic was to be preferred to gas and ether. The operation consisted in the removal of one lateral lobe and the isthmus along with ligature of the opposite superior thyroid artery and vein, or the removal of the greater part of the gland, leaving only a portion of one lateral lobe behind. While advising that medical treatment should be first tried in all cases owing to the undoubted possibility of a cure resulting, Hartley urges that surgical measures should not be delayed too long, in the interests of patient and surgeon alike.

The Surgical Treatment of Tuberculous Cervical Lymph Glands.

The relative value of radical operation and conservative measures in the treatment of tuberculous glands in the neck is still a matter of dispute, although the more general opinion favours early excision as the best method of treatment. Two questions of importance have to be decided before excision can be recommended as a routine measure, namely, Does the disease tend to spread from the glands to other parts of the body in any considerable proportion of cases, and is the operation a safe one? Both these questions are answered decidedly in the affirmative by Dr. Dowd in his paper on the Surgical Treatment of Tuberculous Cervical Lymph Nodes (*Ann. Surg.*, St. Louis, 1905, July). An extensive study of the records of cases treated by both methods leads him to conclude that "the disease is a serious one, and frequently leads to tuberculosis of the lungs or other parts of the body." The percentage of cases developing tuberculosis elsewhere after infection of the cervical glands is given by various authors at from 10 to 40 per cent. That the operation is in careful hands a relatively safe one, is shown by Dowd's series of 100 cases without a single fatality or serious complication, and by his quotation of the results of four other operators, giving a total of 1084 cases without a death. Dr. Dowd has carefully followed up his cases after operation, and the more important conclusions he has arrived at from his own observations and his study of the records of others may be quoted. (1) The disease shows a tendency to extend to the lungs and other internal organs. Statistics indicate that such extension occurs in from one-quarter to one-half of the cases from whom the nodes are not removed. (2) The thorough removal of the diseased nodes by operation has given better results than any other method of treatment which the writer finds recorded. (3) The records of operations justify the following assurances—(*a*) In favourable cases: safety of operation; freedom from recurrence in 75 per cent., and ultimate recovery in 90 per cent. of cases. (*b*) In the less favourable cases: safety of operation; less disfigurement from scars than discharging sinuses will cause: freedom from recurrence in 50 to 55 per cent., and recovery in 70 to 75 per cent. of the cases. (4) It is not feasible to divide the cases into groups, some suitable, others unsuitable for operation. Every case with tuberculous cervical lymph nodes should be operated upon, unless there is a particular reason to believe that the operation would not be endured.

An extensive list of references accompanies the paper.

The Present Position of Spinal Anæsthesia.

In reviewing the present position of spinal anæsthesia, Bier (*Arch. f. klin. Chir.*, Berlin, Bd. lxxv. Heft 1) relates his results in 102 cases in which he used stovaine instead of cocaine. In eight of these, complications occurred during the anæsthesia—vomiting seven times, slight collapse once. In ten cases unpleasant after effects were noted, consisting of headache and sickness, but these lasted only a short time. Bier's experience of stovaine therefore has been similar to that of others, who have found that its use for inducing spinal anæsthesia is seldom attended or followed by complications. In this respect it is manifestly to be preferred to cocaine, for, according to Bier, complications arise in 70 per cent. of cases when cocaine is used. He invariably uses suprarenin or some other preparation of suprarenal gland along with stovaine or cocaine.

Bier gives the indications for the use of spinal anæsthesia as follows: (1) In old and weak patients; (2) in military surgery; (3) in veterinary surgery; (4) in physiological experimental work.

The dangers of the method have been removed by the use of suprarenal preparations and the substitution of stovaine for cocaine, while the complications and after effects have been very much diminished by the same means. The chief objection to the use of spinal anæsthesia is the occasional complete failure of the method, this having occurred in 4 per cent. of Bier's last 300 cases. It is to be expected that wider experience will diminish the number of failures, and render the method more nearly perfect.

OBSTETRICS AND GYNÆCOLOGY.

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Vaginal Ovariotomy.

Buerger (*Centralbl. f. Gynäk.*, Leipzig, 1905, No. 17) reports on 110 cases, with one death. He recommends that during pregnancy the vaginal route should not be employed, on account of the greater tendency to bring on abortion, as compared with abdominal section. In the same journal, Werner reports the mortality after operations for ovarian tumours as 35 per cent., but the majority of deaths were due to malignancy, the mortality of which was 14·6 per cent., for benign tumours only 1·3 per cent., and in uncomplicated cases less than 1 per cent. He recommends vaginal ovariotomy on account of its being shorter, simpler, and followed

by more rapid convalescence. It was contra-indicated, however, in malignant tumours, extensive adhesions, and solid tumours of large size. As regards technique, he prefers posterior colpotomy as offering no risk of injuring the bladder.

Posterior Colpotomy for Pelvic Suppuration.

Porache (*Centralbl. f. Gynäk.*, Leipzig, 1905, No. 5) reports six cases exemplifying the three types of pelvic suppuration, namely, phlegmonous inflammation of the pelvic connective tissue, perimetro-salpingitis, and pyosalpinx. All were successfully treated by posterior colpotomy, and left hospital on the fifteenth day. He believes that more extensive operations with removal of the affected parts are unjustifiable, as giving no better results. Taylor (*Brit. Gynæc. Journ.*, 1905, May) reports three somewhat analogous cases. They were examples of the thrombotic form of puerperal fever, and in each case the side of the uterus and broad ligament was opened up from below in order to reach the centres of suppuration, which were afterwards drained with moist iodoform gauze.

Papillary Ovarian Cysts.

Pozzi (*Centralbl. f. Gynäk.*, Leipzig, 1905, No. 9) points out that those cysts are not necessarily to be regarded as malignant, although they may be accompanied with ascites, and have affected a large portion of the peritoneum and omentum. The implantation of papillomatous masses with a single layer of epithelium, is not a similar process to the spread of cancer by way of the lymphatics and veins. He recommends extensive surgical extirpation of those tumours. He has observed the peritoneum becoming spontaneously free from implantation masses (corresponding to the improvement brought about in tuberculous peritonitis) after laparotomy.

Gangrene following Eclampsia.

Gutbrod (*Monatschr. f. Geburtsh. u. Gynäk.*, Berlin, Bd. xxi. Heft 6) reports the case of a primipara, æt. 22, who had one fit before and fifteen after delivery. She was treated with chloral, morphia, venesection, and hot packs. It was soon noticed that where skin had been in contact with skin the parts had become gangrenous. So extensive was the destruction of the parts involving the right foot, that amputation had to be resorted to. Gutbrod also reports a second case somewhat similar, where, however, a small injury may have occurred to account for the gangrene. In both cases there was a small amount of albumin in the urine. The theory suggested is, that the poison, instead of being got rid of by the kidneys, is excreted in larger amount by the skin, where it sets up a process terminating in necrosis of the cutaneous tissue, just as necrosis is known to occur in the kidney and liver in many cases of eclampsia.

Pseudo-Ascites in Ovarian Tumours.

Horinann (*München. med. Wchnschr.*, 1905, March 21) regards free fluid in the abdomen with ovarian tumours as a secretion from the epithelial covering of the tumour, and not a true ascites. This secretion may lie free in the abdominal cavity, and later give rise to epithelial implantations in other parts of the abdomen, or it may be poured out as the result of the cyst rupturing, its subsequent absorption depending on its consistence. Horinann points out that many such cases are wrongly diagnosed as malignant on account of the apparent rapid increase in the size of the tumour.

Experimental Hydramnion in Nephritis.

Bibergeil (*Berl. klin. Wchnschr.*, 1905, April) experimented on two dogs, producing nephritis by the administration of drugs, and then examining mother and fœtus as to the presence of ascites. In both cases nephritis was produced in the mother; changes in the fœtal kidneys, ascites and hydrothorax in the mother, and a small amount of effusion in the fœtuses. In both there was an increase of amniotic fluid. The author therefore concludes that nephritis may be one cause of hydramnion, as well as producing effusions into the fœtal tissues.

Puerperal Tetanus.

Roderer (*Am. Med.*, Phila., 1905, March) reports a case with recovery. The symptoms appeared ten days after delivery. From this time onwards to the fourteenth day she had tonic spasms, clonic spasms then commenced and lasted till the twenty-seventh, during which time she had at least 1500 convulsions. Antitoxin was administered on thirty-two occasions, in all 660 c.c. being given.

Purgation before and after Operation.

Stone (*Am. Med.*, Phila., 1905, February 25) believes that excessive purgation should be restricted, as it is enervating to the general system. It produces great irritation of the mucous membrane of the bowel, and adds to the dangers of ileus and paresis. Purgatives have little effect in limiting the amount of extra-peritoneal fluids. In place of calomel and saline purgation, bland evacuants, such as castor-oil, are to be preferred before abdominal section. After operation, enemas should be given to relieve distension, and favour peristalsis in a downward direction, laxatives being given later as required.

THERAPEUTICS.

UNDER THE CHARGE OF

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The Treatment of Pneumonia.

Hare points out that statistics as to the mortality of this disease are useless for practical purposes, since, as a rule, they fail to distinguish between pneumonic cases of a primary nature and those in which the pneumonia is a terminal infection. Again, croupous pneumonia is very common in old age, so that in one sense it is here a terminal infection, attacking the individual when advanced years have deprived him of the ability to withstand invasion by micro-organisms. Statistics may be also rendered inaccurate from mistaken diagnosis leading to the inclusion of cases of acute pneumonic phthisis and catarrhal pneumonia, while it is probable that an occasional case of infarction, or even of pulmonary œdema, may enter the record as examples of croupous pneumonia. Reliable statistics must therefore include careful differentiation as to whether the cases were primary or secondary, and must afford complete information as to the patient's age and condition at the onset of the disease. For practical purposes, Hare divides cases of pneumonia into three classes—(1) Those in which no treatment can be of any value, for though the lesion is small the system is, from the start, overwhelmed by a profound toxæmia. (2) Those cases which can only recover if they receive intelligent aid and support at critical periods. (3) There is a class of case which gets well despite treatment or even without any treatment.

In the toxæmic class of case therapeutic measures cannot promise much, unless it be that by maintaining activity of the kidneys and liver through the action of alkaline and hepatic stimulants, we may eliminate or destroy poisons. Occasionally hypodermoclysis, either alone or following venesection, may do good; but here we must consider whether the blood has so far lost its bacteriolytic and other powers for good, that it is less valuable to the patient than is salt solution. For toxæmic cases the best heart stimulants are Hoffmann's anodyne and aromatic spirit of ammonia. Digitalis is seldom valuable. Strychnine is only of use if it is kept to tide the patient over a critical period. It is bad practice to give it regularly in full doses before there is any indication for its use. Nitroglycerin is often wrongly used. It is only of use for reducing high arterial tension. In cases where the tension is high, the kidneys inactive, and the skin hot and dry, it is often valuable. When the first sound lacks tone and the pulmonic second sound is accentuated, Hare administers 5 minims of a physiologically tested tincture of digitalis every four or eight hours, and every two to four hours 10 minims

of an equally active tincture of belladonna. If the fever is high, he finds that it is necessary to apply an ice-bag over the heart to get any value from the digitalis. The belladonna is given more frequently, as its effect is less lasting than that of digitalis. Where the circulatory condition is urgent, Hoffmann's anodyne may be administered in addition, or camphorated oil may be injected. The value of oxygen inhalations is debatable. It gives comfort to the patient's friends, and sometimes to the patient himself. Morphia may be used where the kidneys are not diseased and are fairly active, if the patient is very restless and sleepless. Often the few hours' rest induced by the hypodermic injection of morphia changes the whole complexion of the case. Like strychnine, however, the morphia should be reserved for real emergencies. Small doses of heroin, codeine, or Dover's powder may be used for the relief of pleuritic pain, or the chest may be strapped.—*Therap. Gaz.*, Phila., 1905, June.

Roemer's Streptococcic Serum in Pneumonia.

This serum is prepared by Merck. It is polyvalent, and is obtained from various animals by the injection of different strains of pneumococci. Very good results were obtained in the treatment of pneumococcic infections of the eye. By injecting sufficient serum, commencing ulcers readily heal, while even advanced ulcers in 80 per cent. of the cases cured spontaneously without requiring cauterisation.

The serum was also tried in seven cases of severe pneumonia. It proved to have no deleterious action. The site of injection showed no reaction, and no skin eruptions or kidney disturbance were noted. Soon after the injection, the pulse, respiration, temperature, and the appearance of the sputum were improved. The subjective sensation was specially affected. A rapid critical fall of temperature was only once noted. As a rule, there was only slight sweating, and the temperature falls gradually. The subsequent stage of convalescence was always quite normal in type. In the first case, the serum was injected on the seventh day of the disease at 11 a.m., 6 p.m., and 12 p.m. In each instance 20 c.c. were injected. In the other cases the injections were made earlier in the disease, and, as a rule, a single daily injection of 20 c.c. was made on two or three succeeding days.—*Deutsche med. Wchnschr.*, Leipzig, 1905, No. 12.

PATHOLOGY AND BACTERIOLOGY.

UNDER THE CHARGE OF

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The Importance of the Presence of the Bacillus Coli in the Water of Springs.

Kaiser (*Arch. f. Hyg.*, 1905, Bd. lii. S. 121) found the colon bacillus present in spring water, and set himself to answer—(1) Is it widely

spread therein? (2) Does it indicate fæcal pollution. By means of a culture medium, made from an infusion of liver, he found he could cultivate the colon bacillus easily if it were present in the spring water, and he found that 22 per cent. of the springs contain the typical colon bacillus, that is to say, one which does not stain by Gram, which does not liquefy gelatin, which ferments glucose, forms indol, and coagulates milk; while 30 per cent. contain a bacillus of the colon group, possessing one or other of these properties. The second and more important question of the significance of their presence he is unable to answer.

Diffuse Sarcomatous Infiltration of the Spinal Pia Mater.

Stanley Barnes (*Brain*, London, Spring Part, 1905), in a thoughtful and interesting paper, gives particulars of a curious case of diffuse sarcoma in a boy, æt. 13, who complained of progressive loss of eyesight for two years. Morning vomiting, having no relation to food, came on about the same time; he complained of occasional headache. The symptoms improved for a time, and he was again able to read large print. They returned later, and he began to have attacks of cramp, affecting both hands simultaneously, and, thirteen days before his death, he had a convulsion. He gradually went down hill, becoming more and more drowsy, and having occasional convulsions, in one of which he died. The dura mater was normal, but the other membranes at the base of the brain were extensively infiltrated with solid tissue, which filled up all the natural hollows, and passed backwards and downwards, surrounding the cord more or less completely throughout its entire length. There was a large tumour on the left frontal region, which had ruptured into the lateral ventricle. This tumour had originated in the ependyma lining the anterior corner of the ventricle. No other large growth was found in the brain, but several gelatinous masses were found growing in the lining walls of the ventricles and forming a more or less continuous layer of growth in the third ventricle, the aqueduct of Sylvius, and the fourth ventricle. The tumour, these growths, and the diffuse infiltration of the pia arachnoid all showed the same structure, mainly a cellular one, the cells being mostly spindle shaped, and although the arrangement was in many places alveolar, there was no doubt that the growth was in all places a true sarcoma. There was some diffuse degeneration of the columns of Goll and Burdach due to the pressure. In another case, in which there was a sarcoma in the brain, secondary to one in the abdomen, there were many sarcoma cells found in the open lymphatic spaces around the ganglia and the roots of the nerves in the cauda equina, though there was no change visible in the course of the cord itself. This growth in the brain had also invaded the ventricle. He gives particulars of nine other somewhat similar cases recorded by other observers, and argues that the diffuse sarcomatous infiltration of the spinal pia mater arises by a rupture of the main growth into the ventricle, thus causing infective particles to become disseminated through the central nervous system by means of the cerebro-spinal fluid. In this way it is easy to trace the path of the infective particles flowing with the stream instead of against it, as

would necessarily be the case if the growth originated in the spinal pia, as suggested by some. His conclusions are important, and seem to be warranted by his arguments. They are, shortly, as follows:—(1) If a growth originates in the caudate nucleus or in any other part of the brain, and eventually finds its way to the lining of the ventricular cavities, it may infect the cerebro-spinal fluid. Metastatic growths may then occur in the following situations—(*a*) In the lining walls of the lateral, third or fourth ventricles; (*b*) in the meninges (subarachnoid) at the base of the brain; (*c*) in the pia mater and arachnoid around the spinal cord; and (*d*) in the posterior root ganglia, particularly in the cauda equina. (2) In all probability diffuse sarcomatous infiltration of the spinal pia arachnoid, which is occasionally found post-mortem, is in all cases the expression of a sarcomatous infection of the cerebro-spinal fluid as a result of some primary growth which lies exposed to the stream of the cerebro-spinal fluid high up in the nervous system. (3) The regions occupied by such secondary growths are exactly the same as those inflamed by tuberculous meningitis after the rupture of a tuberculous tumour of the brain.

The Addition of Calcium Salts to Nutrient Broth, a Reliable Medium for the Growth of the Pneumococcus.

The pneumococcus is a troublesome germ to the bacteriologist, in so far as it is very difficult to keep any particular strain alive. It soon dies out despite frequent transplantations, hence any method of meeting this difficulty will be welcomed. Bolduan (*N. Y. Med. Journ.*, 1905, May 13) claims to have found such a method. It consists in the addition of a small quantity of some calcium salt to ordinary nutrient broth. The most suitable calcium salt is marble. It is broken up into small pieces in an iron mortar. The finer pieces are removed by screening through an ordinary wire crate. The others, about the size of small dice, are washed in water, and one or two pieces placed into each tube. The tubes are then filled in the usual way with plain broth, and sterilised in the autoclave. Out of three different strains grown in this medium, one was still alive at the end of thirty days. Out of four, three were still alive at the end of seventeen days. Moreover, the cultures grown in this way do not seem to lose their virulence, for those grown for fourteen consecutive generations kept their virulence as well as an ascitic broth culture made directly from the blood agar stock cultures. The calcium salts seem to act in a double way, namely, by directly favouring growth and by neutralising acid. The former action is considerable and the latter action slight. Glucose should not be added to the broth, as then the acidity produced by the first growth of the pneumococcus is too great to be neutralised by the calcium salt, and growth quickly ceases. Calcium chloride (0·1 per cent. to 0·5 per cent.) may be used for agar plates. Not only is the growth of the pneumococcus favoured by this means, but also that of the diplococcus intracellularis of Weichselbaum.

Deeper Distribution of the Spirillum Pallida in Syphilis.

The evidence in favour of the general distribution of the *Spirillum pallida* throughout internal as well as the surface lesions of syphilis, appears to be increasing. Schaudinn and Hoffmann have found them in the lymphatic glands (*Deutsche med. Wchnschr.*, 1905, May 4) of eight persons recently affected with syphilis (four and a half weeks to four months). They found them in glands which had been excised, and in fluid drawn off by a hypodermic needle from the glands *in situ*. Levaditi, following up Roux and Metchnikoff's work at the Pasteur Institute, reported to the Société de Biologie of Paris on 20th May that he had found the spirillum in the bullæ of pemphigus in congenital syphilis. In a child, who died one month and twenty-three days after birth, after showing all the clinical signs of congenital syphilis, he found the spirilla in large numbers in the liver. Scrapings from the liver showed an enormous quantity of spirilla. The spleen also showed the parasite, but in smaller numbers. In another case of congenital syphilis, in an infant two days old, he found them in the same situations. Almost simultaneously Buschke and Fischer (*Deutsche med. Wchnschr.*, 1905, No. 18) obtained similar results, which go to prove that congenital syphilis is really an affection due to the penetration of the spirilla into the deep organs. It indeed looks as if all internal syphilis was due to the spirilla migrating from the initial lesion into the deeper tissues and the blood.

The Nature of Paratyphoid Fever and its closely allied Infections.

Fox (*Univ. Penn. Med. Bull.*, 1905, April) gives a very good account of paratyphoid fever, so far as it is known at the present time, and sums up as follows:—(1) Paratyphoid fever differs from typhoid fever in (*a*) a shorter invasion stage and rise of temperature, (*b*) shorter or absent period of continued fever, and (*c*) marked diurnal remissions of temperature, much deeper than typhoid and without periodicity. An absence of the Widal reaction is suggestive if it persists in reasonably high dilution. (2) The duration is on the whole shorter than typhoid, particularly in one type of paratyphoid, namely, the type *b*. (3) The general findings of the type *a* cases of paratyphoid are nearer to typhoid than type *b*, the latter presenting a picture more like septicæmia. (4) The complications of type *b* are more numerous, more purulent, and more fulminating. (5) The causal germs belong to the intermediates of the typhocolon series, the type *a* being nearer to the *Bacillus typhosus* and the type *b* to the meat-poisoning group. (6) The clinical evidences of the respective organisms just named agree with their general properties and relations to infections in this order, ranging from the subacute typhoid to the hyperacute meat-poisoning. (7) Antityphoid serum will clump the paratyphoid bacillus at the same time as the *B. typhosus*, sometimes even in higher dilutions, so that a positive reaction of a patient's serum to both *B. typhosus* and *Paratyphosus bacillus*, even if the latter be in higher dilutions, will not permit a diagnosis. On the other hand, only twelve times in ninety-four cases of typhoid fever did

the serum react with the type *a* and not with the *B. typhosus*, a fact which may be taken as nearly a proof of the existence of an *a* para-typhoid infection. (8) It seems probable that there must be some other factor responsible for co-agglutinations than an increased value of the agglutinins present in the blood. (9) That the best proof of the existence of a para-infection is the isolation of the bacterium, the saturation test, and, lastly, the bactericidal action.

PHYSIOLOGY.

UNDER THE CHARGE OF

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Pancreatic Secretion in Man.

The work of the Pawlow school on the mechanism of pancreatic secretion has attracted the attention not only of physiologists, but also of clinicians, and perhaps no part of the investigations has appealed more to both than the close relationship which was shown to exist between the amount and character of the ferments in the pancreatic juice and the foodstuffs which called forth the secretion. It was but natural that doubt would be cast upon the results which appeared to agree so closely with those which we would expect to obtain were the ferments of the juice called forth only by the foodstuffs upon which these enzymes normally acted, that is to say, the fat-splitting ferment by fats, the diastatic by starches, and the proteolytic by proteids. Among the opponents of the Pawlow doctrines may be mentioned Popielski (*Centralbl. f. Physiol.*, Leipzig u. Wien, Bd. xvii. S. 65). He was unable to detect any such close relationship as the experimental results of Wassilief, Walter, and Lintwarew seemed to have conclusively proved. But even were these experiments of the Russian school proved to be correct, they would only hold for the pancreatic secretion of the dog, while in the case of man the relationship between ferments and foodstuffs might be absolutely different. Rather less than a year ago, Glaessner (*Ztschr. f. physiol. Chem.*, Strassburg, Bd. xl. S. 465) obtained from a fistula pancreatic juice which may be regarded as normal; but the most careful quantitative analysis of human pancreatic juice was that given by Schumm (*Ztschr. f. physiol. Chem.*, Strassburg, Bd. xxxvi. S. 292), although in this case the fluid was obtained from a pancreatic cyst. These investigators, however, referred mainly to the chemical composition of the juice. Ellinger and Cohn (*Ztschr. f. physiol. Chem.*, Strassburg, Bd. xlv. S. 28) were enabled, through the courtesy of some of their clinical colleagues, to examine the juice obtained from a pancreatic cyst; and as the secretion was large in amount, and appeared to be normal when compared with the analyses of Glaessner and Schumm,

their results may be accepted as holding good for the human pancreatic secretion. The chemical analyses of the juice need hardly be referred to, except in so far as they refer to the ferments. In the first place, an active proteolytic ferment was never found preformed in the juice; but the addition of an enterokinase solution, obtained in the usual way from the mucous membrane of the jejunum, converted the inactive into the active ferment. The juice was, however, not so active as that obtained by Glässner. It was also found to contain, in fairly large quantity, active diastatic and fat-splitting ferments.

The effect of different diets upon the activity of the secretion was also investigated. On a mixed diet, the juice which was secreted was found to be richest in all the ferments. On a diet of fat, the juice was moderately rich in fat-splitting and diastatic ferments, and poor in proteolytic. On a purely flesh diet, the juice was richer in proteolytic ferment than on a fat diet, but poorer in diastatic and in fat-splitting ferments. On a diet of starchy foods, the juice was poorest in all the ferments. One, unfortunately, cannot feel entire confidence in these results, as the effect of the mixed diet was studied earliest in the series and starches last. One must remember that in all probability in the interval the character of the juice had changed.

The Influence of Copious Water Drinking.

This has been made the subject of many investigations, but the results obtained have been at variance with one another. The larger proportion of those who have studied the subject hold that there is at least a slight increase in the excretion of nitrogen; but even among those there is a good deal of doubt expressed as to whether this is due simply to better washing out of the tissues, or to an increased metabolic activity in addition. Thus Salkowski states that unless water be taken in enormous quantity, the increase in the excretion of nitrogen is almost negligible. Rubner, however, and a fair number of others, have noticed a very marked increase in nitrogenous metabolism after the ingestion of fairly large quantities of water.

Seegen, Fränkel, and some others have been able to detect no increase in nitrogen excretion even when fairly large quantities of water have been taken. Hawk (*Univ. Penn. Med. Bull.*, Phila., 1905, March) carried out a careful investigation on this subject. He studied the influence of copious water drinking in man, estimating not only the nitrogen, but also the SO_3 and the P_2O_5. His analytical methods were those which are usually employed in exact investigations, and the food and fæces were analysed as well as the urine. His conclusions may be shortly summarised. Copious water drinking produces an increase in the excretion of nitrogen, sulphur, and phosphorus, the increase in the nitrogen being due, primarily, to the washing out from the tissues of the urea previously formed, but not yet removed, by the normal processes, and, secondarily, to a stimulation of proteid metabolism.

The increase in the excretion of phosphorus is due to increased cellular activity, especially affecting the katabolism of nucleins, lecithins, and other phosphorus-containing bodies. The SO_3 excretion, although

somewhat irregular, ran a more or less parallel course with the nitrogen, that is to say, the most marked rise taking place on the first day, and gradually falling on the second. The course of the P_2O_5 excretion was distinctly different from the nitrogen and sulphur, the maximum excretion always taking place on the second day, and the amount remaining above normal to the close of the experiment.

Thus the influence of the copious ingestion of water upon phosphorus-holding tissues is different from its effect upon nitrogen- and sulphur-containing bodies. There seems to be no doubt that there is an increased excretion such as Hawk refers to, and in all probability both factors are concerned in this increase, a better removal of preformed urea and sulphates, and an increased katabolism, especially of phosphorus-holding tissues. The results obtained are what one would naturally expect to be produced under the influence of an agent which removes effete products.

Accommodation and Intra-ocular Pressure.

The question as to whether accommodation is independent of intra-ocular pressure has been discussed both by ophthalmologists and physiologists. Heine (*Arch. f. Ophth.*, Leipzig, 1905, Bd. lx. S. 448) shows, by an interesting experiment, that accommodation can take place without the intra-ocular pressure being affected. He obtained from Dr. Otto Meyer a child's eyeball which had been freshly removed for a tumour at the corneo-sclerotic junction. The eyeball was placed between two ring electrodes, one at the corneo-sclerotic junction, and one at the entrance of the optic nerve, care being taken to avoid pressure. Accommodation at once occurred on stimulation with the weakest faradic current. A tiny wound was then made with a Graefe knife at the equator, and a small drop of vitreous exuded. During accommodation not the least change took place in the drop of vitreous. The refraction before and after stimulation was estimated. Thus, even under conditions when contraction of the ciliary muscle can produce no compression of the vitreous, accommodation can take place to its normal extent. Beer (*Wien. med. Wchnschr.*, 1898, S. 42) carried out practically the same experiment on the monkey's eye, with the same result.

Opening the vitreous chamber produces no relaxation of the suspensory ligament. The lens in the resting eye is rendered independent of the intra-ocular pressure by the firmness of the sclerotic, just as a thick or firm rubber ball maintains its form without collapsing, even after a piece has been removed. It is a point of great importance that the height of the intra-ocular pressure is without significance as regards the tension of the zonule and the attached choroid.

DISEASES OF THE EYE.

UNDER THE CHARGE OF
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The Nutrition of the Lens and the Cause of Cataract.

Upon this subject, of so serious importance, three papers of considerable note have very recently appeared. These have been contributed by Leber (Heidelberg), by Paul Romer (Wurzburg), and by Zirm (Olmutz). Leber's article is to some extent polemical, and a justification of the opinions which he had expressed in his valuable monograph on the circulation and nutrition of the eye, against the attacks of Peters. Into the controversial side of the matter we have no motive here to enter, but certain of the points in dispute involve questions of great importance. In lamellar cataract, for example, Peters regards shrinking of the central portion as primary, Leber considers this to be merely a secondary change. To support his opinion, Peters endeavoured to bring cataract caused by tetany, and even senile cataract, into line with the other, though later he seems rather to have favoured the view that (in tetany) spasmodic action of the ciliary muscle was the cause. A serious objection to this theory is that von Hippel was unable to cause cataract by long-continued and severe spasm of the ciliary muscle, which he brought about by the use of eserine. In consequence of the results of this experiment, in part at least, Peters has abandoned the spasm theory, and asserts that tetany is caused by an auto-intoxication, and that this poisonous material, directly or indirectly, injures the epithelium of the ciliary region, on whose integrity the transparency and good nutrition of the lens so greatly depend. As a result of the presence of this toxic material, and of the damage it does to the ciliary epithelium, the aqueous humour contains more cells and more salts, and consequently the osmotic interchange is altered. It is, however, more than possible that the swelling, cloudiness, etc., of the epithelium of the ciliary body, on which Peters to some extent founds his theories, may be due either to a post-mortem decomposition change or to the action of some of the hardening agents employed. In regard also to the irido-ciliary and lens changes which follow the ingestion of naphthalin, the two combatants take opposite views as to what is primary and what is secondary, and an important question in the physiology of the eye is involved in their difference. Peters considers that the irido-cyclitis present is the cause of certain changes in the epithelium, and therefore of cataract. Leber, it is true, denies that the cataract is secondary in that sense, but if Peters is right in saying that these changes involve an alteration also in the composition of the aqueous, and that a chief function of these cells is to prevent certain of the solid constituents of

the blood from passing into the aqueous (which is thus poorer in these salts than the blood normally), then one can understand that when the epithelium is damaged this damming back of salts does not take place to a sufficient degree, and cataract is the result. Leber traverses Peters' conclusions as well as his methods, and asserts that the aqueous is normally not poorer, but richer in salts than the blood, and that its osmotic pressure is higher. This view would postulate, then, an active function for those incriminated cells. Leber's paper, though a very valuable excursus on our present very insufficient knowledge, brings forward nothing really new.

Zirm's article is primarily concerned with the nutrition of the lens in its physiological state; the lens is very sensitive to any change in the nutrient fluids in which it is bathed, and it is therefore essential that these should be uniform in composition and concentration, and should contain no substance capable of causing injury to the lens. If these conditions are not fulfilled, the lens becomes hazy, and its fibres may even be destroyed, without any actual injury to the capsule or the epithelium. The singular and principal points regarding the nutrition of the lens are that the crystalline increases steadily in size with age, since it possesses no means of desquamation, as do other epithelial structures; and that, being without anatomical pores, it is nourished entirely by osmosis. From the aqueous humour various substances in solution there can enter the crystalline, and thence find their escape in the same manner. It should be remembered that while the principal source of nutriment is the aqueous humour, some enters also from the vitreous. If a freshly excised lens is placed in a solution of common salt, either too weak or too concentrated, it either gives off fluid or absorbs it, and in either case it becomes opaque to a greater or less degree. Within forty-eight hours after death, the human aqueous humour doubles its specific gravity, and the lens becomes opaque. In connection with this matter, the occurrence of the cataract of diabetes is of much interest. The most obvious explanation of such an occurrence is that the exaggerated withdrawal of water causes an undue concentration of the fluids of the eye, and consequently cataract, as we have seen,—an impression which is borne out by certain experiments. Thus, for example, Kunde was able to produce partial cataract in frogs by injecting into the system solutions of sodium chloride or of sugar, and depriving the animal of water; the haziness of the lenses in these animals disappeared when they were again admitted to water. It is probable that the cause of the cataract in such a case is that in virtue of the increased concentration of the aqueous humour, fluid is withdrawn from the lens substance. But this can hardly be the direct cause in diabetes, for experimentally cataract can be produced in this way only when the percentage of sugar in the media of the eye reaches as high as 5; one must, however, bear in mind the great difference which exists between a laboratory experiment and the case of a patient affected perhaps for several years with a given disease. Now, in the case of a child under his care, Deutschmann found 8 per cent. of sugar in the urine, but in the media of the eye, examined immediately after death, there was not more than 0·5 per cent. By giving enormous amounts of sugar to rabbits, Deutschmann did not

succeed in raising the percentage above 0·2 in the aqueous, and 0·3 in the vitreous. It does not therefore appear as if the occurrence of cataract was due mechanically to the alteration in soluble constituents. In the case of tetany cataract, the author accepts Peters' theory that it is an alteration in the lens due to disturbed nutrition of the lens caused by changes in the epithelium of the ciliary processes. The theory which Zirm favours is that cataract is due to a trophic disturbance, caused by poisons which form in the intestinal canal, gravid uterus, or other organ.

In the first part of a very long and erudite paper, Romer maintains the opinion that cataract is due to a cytotoxin, which is retained in the eye through some error in the excretory apparatus. In point of fact, no explanation hitherto advanced of the original cause of cataract has been the least satisfactory. Clinical experience gives no support to any theory that failure of general health has anything to do with the majority of cases of that disease, and experiment, according to Romer, indicates that the osmotic pressure may be varied to a great, if not to a relatively enormous, degree, without the lens becoming affected at all. The suggestion which he brings forward is that the lens becomes cataractous, owing to the action of some poisonous substance which kills its protoplasm in a manner analogous to that in which the red blood corpuscle is killed in the process of hæmolysis. We know that the human organism is capable of forming cytotoxic substances of the most various kinds, and of increasing the amount of others present in the blood, and it is not an impossibility that in the degenerative processes of old age anti-bodies may be set free in the blood which have an affinity for a certain part of the lens protoplasm. If the secretory processes are active and normal, the lens will not be attacked, but if these fail, then the cells of the lens suffer. There are, of course, some difficulties in the way of the complete acceptance of such a view. In the first place, though there certainly are exceptions, it is in an ordinary way necessary for the occurrence of hæmolysis that serum from an individual of another species be introduced. It is doubtful if the processes of old age can be brought, without unfair straining, into line with the exceptional conditions in which the opposite takes place. On the other hand, if the formation of substances toxic to the lens be normal, why does not every old person acquire cataract? Romer escapes the difficulty by saying that it is a primary function of the excretory apparatus to protect the lens, and it is only when this function is imperfectly performed that the lens is attacked. But what is the cause, then, of this failure on the part of the excretory apparatus?—Leber, *Klin. Monatsbl. f. Augenh.*, Stuttgart, 1905, March; Zirm, *Wien. Klin. Wchnschr.*, 1905, December; Römer, *Arch. f. Ophth.*, Leipzig, Bd. lx. S. 2.

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EDITORIAL.

The Pathology of Genius.

GENIUS, like art, is an elusive term, and attempts to define it have seldom satisfied others than the inventor. Hence, when we ask for more than a definition—when we seek the source whence genius springs—we are met with such conflicting opinions as that of Galton, who regards it as a normal variation, and Lombroso's statement that genius, morbid as the pearl in the oyster, has an insane or epileptoid basis. Mr. Havelock Ellis's recent "Study of British Genius," a biological analysis of a thousand lives of eminent men selected from the "Dictionary of National Biography," throws some new light on dark places, particularly on the pathology of genius. Gout—*dominus morborum et morbus dominorum*—is proverbially a malady of the scholar, and at least 5 per cent. of Britain's eminent men have suffered from it, while stone, angina, and asthma are also relatively common. Among the gouty occur such names as Milton, Harvey, Newton, Gibbon, Johnson, Pitt, and Darwin—men whose masculine genius contrasts strongly with that of the tuberculous group. The scourge of consumption afflicted a somewhat smaller number—about 4 per cent.—and these chiefly of literary and artistic eminence. Undoubtedly tubercle is an infinitely more common malady than gout, and that the robust constitution which predisposes to the latter might in so far favour genius may be true. But is there a psychology dependent on either disease? Is the correlation of feverish activity and a sensitive feminine temperament with tubercle, and an unresting hasteless energy with gout, more than an accident of age-distribution? Few reach fame before the fifth decade; most of those who have done so in youth have been given over to art; the majority of geniuses therefore have been recognised only at the age when gout is becoming more frequent and tubercle less so, while conversely the phthisical type of ability is precisely that which matures before the bloom of youth is spent. Of greater interest is the question of insanity and genius. In just over 4 per cent.

of the biographies, definite insanity, including terminal senile dementia, is mentioned—not, surely, a high proportion. Less than 2 per cent. tell of ascending or descending insane heredity, while insanity among the wives of eminent men (presumably a reasonable basis for comparison) prevailed only to a slightly less extent than among the husbands. Grave nervous diseases are conspicuously rare; epilepsy, unlikely to have escaped a biographer's notice, is mentioned but twice. Functional abnormalities are relatively common. Stammering, tics, and involuntary movements, clumsiness of gait, inaptitude for muscular co-ordination, and simplicity of mind with a certain lack of perception outside its own sphere, are among the penalties which genius pays. Mr. Ellis takes up a position midway between Galton and Lombroso: he holds that genius is seldom strictly normal, but rightly denies it any necessary connection with insanity. For him, intellectual eminence requires a nervous system sensitively adjusted along special lines with concomitant defect in other directions. It bears analogy to congenital defect rather than to insanity, and the chasm between genius and imbecile is bridged by the man whose originality is bounded by one idea, by the calculator, and by the idiot-savant.

Causation and Prevention of Appendicitis.

It is impossible to controvert the prevailing opinion that appendicitis is a much more common disease than it used to be. If this be accepted, it is surely natural that the laity should expect the medical profession to put its finger upon the cause of the increased frequency, and advise the public how they may best escape becoming the victims of so treacherous a malady. Is the prevalence of the disease to be ascribed to changes in the organ itself, or to changes in the habits and environment of civilised races? There is no reason to believe that the appendix has altered in structure or in function for at least many hundreds of years. The change—if change there be—must be sought in the habits and environment of the individual. The difficulty lies in arriving at the essential factors which determine the onset of appendicitis. It cannot be a question of age, for, although there is a maximum frequency between the ages of twenty and thirty, appendicitis is met with at all periods of life. It is not a question of sex, although an analysis of large numbers of cases demonstrates the greater liability of the male. The question of nationality is not without influence, the disease being comparatively rare in the negro race and in the natives of India and Japan; their relative exemption is ascribed —rightly or wrongly—to the simplicity of their diet and their freedom from digestive disturbances. It is still a popular belief that appendicitis may be caused by foreign bodies, and, in particular, the seeds of fruits, and many people deny themselves and

their children the enjoyment of fruit in consequence. It should relieve the anxious lay mind to know that it is almost impossible for the seeds of cherries, dates, oranges, etc., to enter the lumen of the appendix, and that, while small seeds, such as those of grapes and raspberries, are not infrequently found within the appendix, they are of no special significance in the causation of the disease, as they merely form part of the fæcal material commonly found in the appendix. Threadworms and other intestinal parasites, pins, shot, and other bodies, have been found in the lumen in cases of appendicitis, but such occurrences are so exceptional that they can only be regarded as pathological curiosities.

There can be no manner of doubt that the immediate cause of appendicitis is microbic infection. The normal appendix contains within its canal the infective agents, which, while perfectly harmless in the healthy bowel, only require the advent of circumstances favourable to the exercise of their undesirable activities. Compared to the rest of the intestine, the appendix, owing to its physical peculiarities, has little capacity of repair, so that a surface lesion, which in the ileum or cæcum would pass unnoticed, in the appendix develops aggressive and dangerous qualities. While it is probable that general bacterial infections, such as influenza, may be the exciting cause of acute appendicitis, it is not yet determined whether the general infection merely acts as an exciting factor by preparing a suitable soil for the activities of the intestinal bacteria, or whether the specific micro-organism is the direct cause of the local lesion.

It may be said, in conclusion, that while we know a good deal about the proximate and remote causes of appendicitis, we are as yet deplorably in the dark concerning the important subject of prophylaxis. It is a reproach to our profession that we are unable to tell the father of a family or the headmaster of a school what measures he should adopt to ward off the incidence of such a dire disease among those committed to his charge.

Are Teeth Necessary?

In the *Journal of the American Medical Association*, Dr. Fletcher propounds the question—"To what extent are teeth necessary to civilised man?" and discusses it in a paper of some length. Though chary of committing himself to a definite opinion on the point he raises, he evidently leans to the view that civilised man, having the privilege of choosing his food, tends to select that which, being vegetable, is deprived by previous mechanical treatment of its cellulose envelope or fibrous constituents, so that it may be ingested without being chewed, or, being animal, is by the culinary art so braised, stewed, colloped, or in other fashion cunningly prepared, as to present itself in the form of tempting *bouchées*, rendering the process of mastication a work of supererogation. While we may regret that civilised man should

be so misguided, not to say depraved, as to prefer fine white bread, turtle soup, crème de volaille, pâté de fois gras, cream cheese, ices and dessert, to a stale but nutritious crust, bully beef, hard cheese, and a raw onion, yet pending his persuasion by Professor Chittenden and the dentists to eat less and chew more, we cannot hope to arrest his progress on the downward gastronomic path. As his means and his years increase and his teeth disappear, he will inevitably select the items of his menu with especial regard to their succulence and tenderness. Nor will he be deterred from so evil a course by the warning provided by his lost and loosening teeth: nay, rather will he rejoice that the time approaches when his dentist will provide him with an armament which, while it neither aches nor decays, can nevertheless perform such perfunctory trituration as his soft and sapid diet demands. Here, perhaps, arises the question—"Are artificial teeth a necessity for civilised man?" and in this connection we are glad to see Dr. Fletcher entering a protest against the all too common practice of building crowns and bridges on frail, insufficient, decaying supports.

In all seriousness we may ask whether the great part played by the dentist and his art in the evolution of the social, educational, hygienic, and imperial conditions of to-day has ever been duly noted or appreciated. The greater longevity of the race must be largely ascribed to his ingenious fabrications, which enable the veteran, who without them would gladly sink to an edentulous grave, not only to linger on the stage, but even to ruffle it bravely in the court, camp, or the grove. *Per contra*, many important posts, portfolios, and chairs are held by hoary ancients, who, but for the dentist,—audacious abolisher of Nature's age limit,—would long since have retired to private life, to mumble, with sunken mouths and toothless gums, of old, unhappy, far-off things and Early-Victorian triumphs. So too with statesmen. He now may shake the senate, who, lacking dental prosthesis, could only utter more or less inarticulate quaverings, pathognomonic of senile decay. The giddy grandmother of to-day also gives us furiously to think whether the progress of dental art is an unmitigated blessing.

Some gloomy prophets predict a time when civilised man shall be toothless and hairless. We do not share these forebodings. Natural selection will overcome the evil effect of environment. Good teeth mean good health and good temper: as the Japanese proverb tells us:—"The woman with good teeth laughs at everything."—just the woman to attract a desirable partner, and transmit her excellences to her progeny.

Convalescent Literature.

A MEDICAL contemporary is much concerned as to the literature that should be placed at the disposal of that sensitive creature, the Convalescent, and with that delightful freedom characteristic of the man who deals in generalisations, lays down certain laws for the

guidance of both physician and patient. For reasons which he gives in detail, Meredith is to be vetoed, along with Browning and a few other responsible writers, and only the irresponsible and the palpably intelligent are to be admitted. Mr. W. W. Jacobs is *facile princeps* the *vade mecum* of the sickroom, and so on. Our readers, with this hint, can supply the rest of the argument. Now, our worthy contemporary does not tell us whether his friend the convalescent is a footman or a professor, a society journalist or a literary purist. Our footman, indeed, might find it easier to read Greek than "The Egoist," and our society journalist called upon to read Browning might find himself in the same box as Douglas Jerrold. The incident is a familiar one, but in this season of the gathering of fruits, an appropriate chestnut might not be disdained. The professional humourist, in the stage of convalescence, found by his bedside a copy of "Sordello." He read some twenty lines, and then rang the bell violently. His wife came hurrying into the room, to discover her beloved Douglas gazing about him with the eyes of a prospective madman, and with a cold sweat bursting out upon his brow. "Read that," he cried, handing the volume to his wife. The injunction was obeyed, and a pair of eyes wandered unintelligently over the pages. "What does it all mean?" cried the astonished Mrs. Jerrold. "Ah! thank God, I am not a hopeless lunatic," said her husband, with a sigh of relief, as he sank back on to his pillows. We have no doubt Douglas Jerrold would have been as much at sea over the first chapter of "One of our Conquerors." For him and his class we certainly recommend the delightful and easy-stepping Jacobs; and, descending the ladder of literature, we might even recommend Mr. Barry Pain or Mr. J. J. Bell. But to lay down one absolute law in the matter is frivolous. We see no particular reason why the convalescent should have insults poured upon his intelligence by being excluded from his favourite Meredith, any more than we would propose to exclude Herbert Spencer from the claims of a man who, by habit, finds philosophical reading much more easy of mental digestion than frank fooling. This is not, of course, to argue that Meredith and Spencer and Browning's claims as the convalescent's friends are to be pushed, but it is to argue against the vanity of the large generalisation. Admitting as much, there can be no doubt that there are writers eminently fitted, by their very sanity and grace, to be ranked as worthy of a convalescent's library. Out-of-door men like Richard Jefferies and Robert Louis Stevenson, men with a clear eye and a large hope, are like rays of sunshine in a sickroom. The virile Scott, the fantastic Dickens, clean-cut modern writers like Henry Seton Merriman and Quiller Couch, can be appropriately included. And if any exclusion is permitted, we might be suspicious of the particular kind of fascination exercised by Boccaccio, of the gloom of Tolstoi or Gorki, of the pessimistic pamphleteering of Miss

Marie Corelli. The library of humour is our best friend in the average case—Jorrocks and his friends, Tristram Shandy, Rabelais and Cervantes, Charles Lamb and Swift. The essay is an excellent prescription—Hazlitt, Richard Steele, John Brown, Alexander Smith, and R. L. Stevenson. And then, at a later stage, when the world is about to be faced again, what an opportunity there is for a little pioneering in renaissance or in "rousing." To a young man, what a chance for Carlyle or Emerson or the Stoics! The brain is clean and susceptible. There is the chance of a lifetime. Even the Philistine might discover that there is something in literature after all. You might begin him with Ruskin: you might find him asking for Meredith. Consider the delights of such a triumph! But to return to our first contention. Let us not be harassed by the gospel of the pigeonhole: let us not be tied down by the fallacy of the big generalisation. Let us always remember the personal equation, and even if there be a strong desire for Hervey's "Meditations amongst the Tombs" or Calvin's "Commentaries," let us not be either stubborn-hearted or pig-headed. Let there be neither pedantry nor priggishness. Better that a man should be degradedly happy with Martin Tupper and *The Sporting Times*, than be superbly miserable with Shakespeare and *The Spectator*.

Vanitas Vanitatum!

We knew it would come. We have waited long, and here it is. After many failures, the new woman is to be assailed and conquered by the simplest of all weapons, namely, the one which attacks her vanity. In a few months we may hope, then, to see the golf clubs turned to walking sticks and the hockey sticks reduced to firewood. For the dictum comes from Paris, along with a new consignment of gowns, that athletic pursuits are ruining the feet of our modern woman, and that, if things go on as they are doing at present, there will be little need to draw a distinction between the boot-sizes for men and women. The feet of fairies are evolving into those of clod-hoppers! No longer do the toes come peeping in and out from the skirt like mice, but like veritable rats. There is a good deal of humour in the situation. With a new reading, women are about to fall on their feet. Long have we argued, from a physiological standpoint, that woman is not made to compete with man on the gaming fields, but all in vain, and now the enemy has come in the night and sown the tares of vanity, and there is dismay in the camp of the Amazons. Again, we read that the hatless woman is doomed. She does not use a parasol, and that commodity being the most convincing article in the whole quiver of enticement—shall we say flirtation?—woman clips her wings hopelessly by eschewing it. Reason has failed, but vanity is to be triumphant. Which, after all, is not altogether an unsatisfactory conclusion.

What is a "Medical Official"?

SOME months ago it became necessary to discuss in this Journal the effect of certain legislative movements upon some sections of the profession. The wants and woes of the Poor Law medical officers in the Highlands and in Ireland, and the disabilities under which the Army Medical Corps are suffering, have at different times had attention drawn to them. It might have been hoped that, for a time at least, the thankless task of carping criticism might have been laid aside. But a new menace to the usefulness of the practitioner has appeared, and what amounts to nothing less than a tacit assumption by Parliament that he is unfit to judge when an exception should be made to the operation of the Licensing Act, has been given effect to in legislation.

Cases not infrequently arise in which the prompt administration of alcohol is literally a matter of life or death, especially in the swift and sudden ailments of childhood. One-seventh of these may be expected to occur on Sunday, besides the considerable number which may arise during the night. In such cases the practice under former Licensing Acts was simple and commonsense. The doctor in charge "wrote a line," in point of fact made out an informal kind of certificate purporting that So-and-so was in urgent need of stimulants, and directing the amount that should be supplied. No actual provision was made for this emergency in former Acts, but the custom was everywhere recognised by patients, police, and publicans alike. This is now all changed by the Licensing Act of 1903. Under sec. 55 of that Act, only three classes of person may make this recommendation, and of these the practitioner in charge is not necessarily one. An officer of police, the Procurator-Fiscal, or a "Medical Official," whatever that may be, these are now the only persons who may determine whether a child dying, or in danger of death by diphtheria, or pneumonia, or enteric is, or is not, to have the law diverted to save its life. A case in point has quite recently emerged, which brings out at once all the absurdity, and the possible tragedy of this miscarriage of law. A child lay grievously ill, and the practitioner in charge gave orders one Sunday night that stimulants be procured at once. He certified accordingly, and the father went for the stimulant; only to be told that, as the law now stood, he had best apply to the police for permission. Having done so, he was informed that the certificate of an ordinary practitioner was not enough, that the Medical Officer of Health must certify, there being no officer of police and no Procurator-Fiscal in the town. The Medical Officer of Health was from home, and before anyone could be found with authority sufficient to satisfy the scruples of the powers that be, the child was dead, and in no further need of stimulants or of the protection of the law.

Now, that the provision embodied in sec. 55 is a grievous and

gratuitous insult to the profession, seems beyond dispute. If there is anyone who can speak, and has hitherto been everywhere permitted to speak, with unquestioned authority as to when liquor should be supplied at unlawful hours, it is the medical man in charge of an urgent case. We have never heard that this prescriptive right has been abused. One knows, of course, that attempts are made from time to time by habitual drunkards to beguile the medical man into signing up a bogus certificate; but the profession is quite sufficiently wideawake to "spot" these cases and to refuse them with a smile. We are prepared to assert that there has never been a case in which this custom has been abused. Why then should the only man who can say with authority that the emergency has arisen be completely ignored in the provision dealing with this emergency? At best it is a culpable blunder in the drafting of the Act, and one which should not have escaped every one of the medical Members of Parliament. But it is more than this, for it raises, at a time when every minute perhaps may be of value, an unnecessary difficulty in the prompt treatment of acute disease which in the long run will lead to the extinction of lives that might have been saved had relief come in time. No doubt the section will be read in the most elastic way. The new term, for it is absolutely new to legislation, will be held to cover any official position. But there are doctors in practice who hold, and are rather glad of holding, no official position whatever. To these the advice would be timeous, not to see a case on a Sunday night without a pocket pistol; else may they have to call in as consultant the Procurator-Fiscal! As for the Medical Officer of Health, who apparently is to have this extra burden laid upon him, Heaven help the poor man. Since his appointment, say ten years ago, what things have been laid upon him! His work is burdensome and responsible enough in all conscience; but to it there must needs be added of late the responsibility of the Factory and Workshops Act, the Artisans' and Labourers' Dwellings Act, practically the administration of the Midwives Act, and now it would seem the heavy end of this new provision in the Licensing Act is to fall upon him! Does he not resemble the Issachar of Scripture, the strong ass crouching between two burdens, one assumed at his appointment, the other laid upon him, quite unlawfully, since?

ORIGINAL COMMUNICATIONS.

NOTES ON AN OUTBREAK OF PLAGUE.

By William Robertson, M.D., D.P.H., *Medical Officer of Health, Leith.*

The outbreaks of plague in Glasgow are still fresh in our memories, and the recent visitation of the malady to Leith impresses us with the fact that, after all, the East and this country are intermittently bridged over by fleets of steam and sailing vessels, each of which is capable of establishing a focus of plague infection on our shores. The most recent importation of a case to Manchester is an apt illustration of this point. A steamer arrived at Hamburg, thence she went to Middlesborough, and from that port a member of the crew went to Manchester, where he sickened and died of plague, rats infected with plague being subsequently found on the steamer. That this country has escaped so well is indeed surprising, when one considers how enormous is the traffic between the ports of Britain and those of infected countries. During 1904 no fewer than 1,040,429 natives of India died of plague. Of these deaths, no fewer than 350,000 occurred in the province of Punjaub, possessing a population smaller than that of England. Plague exists in South Africa, South America, and China. It has visited Australian ports, Odessa, Oporto, Alexandria, Port Said, and other shipping centres. These facts indicate how the tentacles of infection have spread themselves. Though we are separated from endemic areas by thousands of miles, it will be excusable, I think, if I cull the following paragraph from Professor Simpson's recent and lucid treatise upon plague. Speaking of the possibilities of famine, war, or atmospheric causes giving rise to scarcity, Professor Simpson says: "It is because of these dangers that the plague in India, with its extensive area of infection, may at any time become a menace to Europe: for it possesses all the potentialities which, once developed, would give it those diffusive qualities that have characterised former pandemics. It has at present reached Cashmere, and is not far from the borders of Afghanistan. Should it attack and pass through the latter country, it then reaches the high road through which so many epidemics have entered Russia and Europe. There is always the possibility of the plague in India assuming the influenza type, and, should this ever occur, there is nothing to prevent a repetition of the ravages that plague committed in the sixth and fourteenth centuries."

These are distinctly ominous words, and, coming from such an authority, they impress one with their gravity. But one must not forget that the sanitation of the fourteenth and twentieth centuries cannot be held up for comparison. Public Health Acts

were not framed to deal with overcrowding, dirt, and disorder. Dark, ill-ventilated, back-to-back, tumble-down houses were not summarily dealt with, and filth diseases were common. Drainage systems had not been laid down, nor was the scavenging and cleansing of streets methodically supervised. And, above all, there were no specially trained officials devoting their undivided attention to sanitation. In a word, we need have little fear of the spread of plague in this country. Our battlements of sanitation are strong, and though we may wince at the presence of the pestilence in our midst, we can fortify ourselves with the reflection that, by enforcing rigorous sanitary measures, we can immediately draw a cordon round the limited centres of infection.

Bad sanitation and plague go hand in hand. This has been abundantly proved in India. Sir Thomas Fraser has laid special emphasis upon the influence of bad sanitation with the spread of plague in his independent report laid before the Indian Plague Commission. Professor Simpson cites numerous instances where, as soon as an infected native village was vacated in favour of a clean compound, the spread of infection ceased. Native hospital attendants in well-aired, clean wards have escaped infection, while their friends and relatives living among unwholesome surroundings have been stricken with plague. In the sixteenth and seventeenth centuries, reliance could not be placed upon co-operation from an intelligent population. Our citizens have now been educated to understand the full significance of such a dangerous encroachment as plague. My experience in Leith affords strong testimony in favour of present-day intelligence and common sense as accessories to rigorous sanitary strictures. The full significance of plague and its attendant dangers were quickly grasped by the inmates of the houses in the neighbourhood of the infected district. For over a week windows were kept fully open night and day, and no householder offered dissent to the burning of sulphur in his house in order to frighten away rats and to kill vermin. Panic was absent, and in its place there appeared to be suddenly instilled into the minds of the inhabitants a strong desire to practise sanitary reform, in order to ward off the possible chance of infection.

In India, as soon as a native village is visited by plague, the inhabitants bundle up and fly. The difficulties of dealing with disease under such circumstances must be enormous, and bordering upon the impossible.

Having laid special emphasis upon the slight danger of spread of infection in this country, the experience of Glasgow may be cited as a direct contradiction. It must, however, be kept in mind that eight cases of plague had occurred in Glasgow before the true nature of the disease was suspected to exist. A death took place, and a "wake" was held over the body. This formed an ideal focus for the spread of infection. In point of fact, that "wake" was the prelude to a series of over thirty cases of plague.

It was only when a suspected case of enteric fever was sent into Belvidere Fever Hospital that the ominous bubo was detected, its contents examined, and the seriousness of the situation revealed to the health authorities. Our experience in Leith was happily more fortunate. It is most significant, however, that, had the death of our first patient taken place in his own house rather than in hospital, the situation in Glasgow might have been repeated in Leith. A "wake" would undoubtedly have been held, and, knowing the contacts and relatives as I came to know them after their ten days' sojourn in the reception house, I dread to think of the possibilities of that "wake."

To come to the point, let me deal with the history of the Leith outbreak.

Cases.—On the 5th of June, a man, æt. 43, employed by the Corporation as a street labourer, was sent to hospital, and notified to be suffering from enteric fever. The history was that he had been seized with sudden illness on the 4th, the day before admission; severe giddiness, headache, vomiting, and complete prostration being the leading features of the onset. He had been at work on the 3rd inst., but had for some time been drinking heavily. Confronted with that confusing element, it is not hard to understand why, despite his sudden collapse, the man's illness was suspected to be enteric. Reliance had also been placed upon the Diazzo reaction, which cannot, in the light of our present-day knowledge, be held to be a reliable diagnostic. After the patient had been in hospital for two days, it was realised that his illness must be some other than enteric. Typhus was suspected; his prostration, temperature, feeble pulse, and negative Widal lending strength to that view. Added to that, we knew that his wife worked in a rag store, and though the season was against the typhus theory, the possible chance of Aberdeen rags having harboured typhus infection was not lost sight of.

Aberdeen, it may be mentioned, is, like Glasgow and Leith, an important rag emporium. On the evening of the 7th, after the patient had been removed to a well-aired ward, a swelling was detected in his left groin. Such swellings have been found associated with typhus—rarely, it is true—and a close examination of the wrists, ankles, and chest revealed a subcuticular mottling, with here and there petechial spots, scarcely typical of typhus. On his back there were numerous petechiæ, which one could best liken to inflamed flea-bites.

Next day, on the 8th, a little girl, æt. 3, the daughter of our first patient, was also sent into hospital as a case of enteric fever. Two days before admission she had taken to bed, vomiting and fever being leading symptoms. Prior to that time she had been in perfect health. Coming from the same house, and with a history of quick onset, the typhus fever idea still prevailed, but when a bubo in her left Scarpa's triangle was detected, our worst suspicions were suddenly aroused. The swelling was about the size of a small walnut. It was tough, irregular, not very painful, and the overlying skin adherent. A hypodermic was thrust into the father's bubo, and the serum exuding from the seat of puncture collected in empty vaccine tubes. Examination of the fluid

revealed the unmistakable presence of the bipolar staining bacilli of plague. For verification, two tubes were sent to Dr. Buchanan, the Glasgow Municipal bacteriologist, whose experience with plague had been wide, and from him came a corroborative microscopic diagnosis of plague.

On the 9th the father looked very ill. He lay in bed with his thighs flexed up on the abdomen, this position being assumed by plague patients when suffering from inguinal bubaes. His bubo had enormously increased in size. It was tense, brawny, and angry, and had it been an ordinary cellulitis would have called for immediate and free incision. The tissues over the left half of the abdominal wall were infiltrated, and bore the characteristic look of a deep cellulitis with the superadded feature of severe bruising of the skin, the discoloration being doubtless due to the rupture of many blood vessels induced by the sudden and rapid stretching of the skin. On the 10th the scrotum and penis were greatly swollen and dark, suggesting to one's mind the existence of urinary extravasation. The man was extremely restless, suffered great pain, and was collapsed. His pulse was thin and almost imperceptible. His speech was very thick, and his eyes injected; but his intellect remained perfectly clear. In point of fact, when Dr. Mowat, my resident, made his nightly ward visit at 1 A.M. on the 11th inst., the patient remarked that he felt perfectly well, yet half an hour later he died of heart failure.

It may be said that the course of the temperature is not always the best guide for prognosis. Fluctuating temperatures, according to Professor Simpson, may mean nothing. A sudden fall of temperature, with a collapsed condition of the patient, usually indicates a fatal issue. A fall of temperature between the sixth and seventh day is usually a favourable sign. In some cases the temperature remains uniformly low or even subnormal. This last feature was found associated with one of the Leith cases. Strange as it may read, cases are known where the illness merely leads to indisposition, with headache, giddiness, and a bubo in the neck, groin, or arm pit. The patient is not confined to bed, but after a considerable lapse of time death may take place as a result of heart failure. This is mentioned to dissociate one's mind from what might be termed text-book symptoms of plague. Text-book symptoms cannot therefore be kept before one as infallible guides to plague or any other infectious disease. I have smallpox as another infectious disease in my mind when I say this.

After a great deal of coaxing, the friends consented to a post-mortem examination, at which the following results were discovered. The body was that of a well-nourished, muscular man. The left groin, scrotum, and penis were distended and discoloured. The swelling had reached the level of the ribs on the left side, and involved the greater part of the left abdominal surface. The inguinal glands when cut into were matted together and adhering to the surrounding tissues. These again were boggy and wet. From the inguinal glands plague organisms were culturally grown. The spleen was greatly enlarged, and from it Dr. Noel Paton and Dr. Buchanan recovered organisms pathogenic to mice. The lungs exhibited patchy basal consolidation. The kidneys were slightly enlarged.

The body was buried in a part of the cemetery where the grave could not be interfered with without the consent of the Medical Officer of Health. This precaution was scarcely necessary, however, since in the presence of putrefying matter plague organisms quickly disappear. It is not easy, for example, to recover plague bacilli from a suppurating bubo.

The child's condition led one to suppose that her illness was to end fatally. Especially was the pulse bad, being weak, rapid, and thin. One could best liken it to the pulse of a grave case of diphtheria. Under the influence of strophanthus and brandy, the child's pulse improved. The cheeks were covered with a hectic flush, the eyes being clear and glassy. When addressed, the child's face exhibited a remarkably startled look. This, as subsequent events proved, was a concomitant of the illness, since, on recovery, the little girl was apathetic and sluggish in her action and speech. When Dr. Chalmers of Glasgow saw this patient on the 11th, he anticipated a fatal termination, so prostrate did she appear as she lay in bed, her head flexed on her breast and the knees curled up on the abdomen. No spots or rash were detected anywhere on the body. The bubo had increased in size, and was as large as a Tangerine orange. The overlying skin was adherent and beginning to show redness. As events subsequently proved, the child recovered, and the bubo did not burst. When she was dismissed on the 15th of July, the bubo had disappeared, the only trace of it being a slight firmness of the tissues, the result of inflammatory matting.

As soon as the plague organisms had been discovered, a visit was paid to the infected tenement, which was situated in a densely populated part of the burgh. The tenement was of recent construction, and thoroughly modern in every way. There were three flats. That on the street level was composed of shops, the upper two flats consisting of two-roomed houses entering from open balconies. In point of fact, it was the very type of tenement which every Medical Officer of Health would specify were he asked to suggest houses for the artisan classes. The walls and floors were perfect, the lighting and ventilation excellent, and the sanitary conveniences attached to each house left nothing to be desired. It was the last place, in this country at least, where one would have expected plague to break out.

The infected house was on the second flat, and, like all the others, very clean. I found the wife of our first patient in bed, and being treated for a swelling in her left groin immediately below Poupart's ligament. Up till the 4th inst. she had been at work at a large rag store in Leith. On that date she fancied she had, whilst at work, twisted her leg. She experienced pain in walking, this being a characteristic symptom of onset in those affected by inguinal buboes. When I examined the patient, she was lying on her back, her thigh flexed on the abdomen ; I noticed also that her face bore a peculiarly anxious expression. The bubo covered an area about the size of the palm of one's hand, and was very tender on palpation. This proved that the bubo had been present for some time. On account of the interference with collateral circulation, the superficial veins were enlarged below the swelling. The patient was three months advanced in pregnancy, and since the 4th inst. there had been a slight uterine discharge, which as the days went

past had been increasing in amount. This flux presaged abortion, which invariably follows an attack of plague. Her temperature was 102° F.

The remaining member of the family was a little boy, æt. 9, who was, at the time of my visit, out at play. After waiting for him to be secured, I discovered that on the left side of his neck there was a distinct bubo, slightly tender on pressure. This boy had never shown any untoward symptoms of illness or discomfort. In the course of an hour these two patients were removed to the hospital, and placed beside the other two members of the family.

On the 17th inst. the mother's temperature rose to 105° F., with the accompaniment of severe backache and abdominal pains due to the expulsive efforts of the uterus. Her face was flushed and bedewed with perspiration. Early next morning she aborted, and next day her temperature fell to normal, where it remained until the date of her discharge from hospital. For a fortnight the skin overlying the bubo remained very soft, but by slow degrees absorption took place, and when discharged a thickening of the underlying tissues was the sole trace of the bubo. A very pronounced symptom in the mother's case was the marked thickness of her speech, suggestive of the dry tongue after a large dose of morphia. This thickness of speech persisted for a fortnight. All through her illness her intellect remained clear.

Though the thickness of speech associated with typhus can be likened to that occurring in plague cases, there remains the feature of clear intellect in plague which is foreign to typhus.

The course of the boy's illness was uneventful. His temperature never rose above normal. It was necessary, however, to incise his bubo, which followed the course of ruptured plague buboes in that it kept discharging for a very long time. He was admitted on the 10th June, and did not leave hospital till the 27th of August.

Treatment.—In the father's case this was purely tentative. Stimulation with brandy and strophanthus and strychnine were resorted to, and the bubo treated with hot fomentations. The bubo was not incised, because nothing was to be gained by the step. True, the man's intense agony might have been relieved, but one had to consider the risk to the nurses and attendants, since it had been proved that the exuding serum from the bubo teemed with plague organisms. The man died on the 11th inst., on the seventh day of his illness. Yersin serum was used for the three other cases, 40 c.c. being injected into the drainage area beneath each bubo.

Very conflicting accounts are given regarding the efficacy of serum therapy in plague. No good results have ever been secured in Hong Kong by the use of Yersin serum, and in the Kennedy Town Hospital, where they used Calmette serum, in ninety-four cases the mortality was 85 per cent.

It is just possible, however, that intravenous injection of serum might yield better results, just as the intravenous injection of antitoxin does in diphtheria. One must also be chary as to statistical results, since good figures after serum therapy may after all only be associated with a sequence of inguinal types of plague.

Septicæmic and pneumonic cases resist all manner of treatment.

That the intravenous injection of serum in bubonic plague may do good, is shown from the hospital results at Brisbane, where the mortality was only 17·2. In the preceding year, without the aid of serum, the mortality was 44 per cent. Again, in 1902, serum treatment gave a mortality of only 13 per cent. Reports appear to prove that serum therapy offers better results when administered to whites than to blacks. As a set off to that statement, one must bear in mind that the mortality among whites is much smaller than among black or yellow races. During the Glasgow outbreaks Yersin serum was used intravenously, and with apparently good results. In Leith the convalescence of the three patients had been established before serum was secured. One result of the hypodermic injection was seen in the immediate reduction in the sizes of the buboes.

Dr. Mowat was injected with 20 c.c. as a prophylactic, first because it was indicated after his exposure to infection; and secondly, because the after effects are not so severe as those following the administration of Haffkine serum. The disadvantage of Yersin is that the immunity conferred is only for three weeks, whilst in the case of Haffkine it is claimed to last for much longer. Dr. Mowat was troubled with urticaria for a few days around the seat of puncture, and suffered from slight malaise and headache. That complete immunity is not conferred by Yersin, is proved by the fact that a member of the Glasgow sanitary staff developed plague after he had been immunised. His attack was, however, an extremely mild one.

The origin of the outbreak.—The actual origin of the outbreak will, I fear, remain shrouded in mystery. By a process of exclusion we arrive at the following facts:—The invaded house was to my mind a perfect one, as far as a working man's habitation goes. There were no possible entrances for rats. The cellars underneath the shops on the basement flat were proof against the encroachments of rats or vermin. The floors of all the houses were lifted, but no traces of dead rats or mice could be seen. There were many rats in the neighbourhood, which was close to the upper reaches of the harbour. Rats were caught in this district, but not one showed any traces of plague, nor had there been any mortality noticed among rats or mice in any part of Leith. The husband who died was a street labourer in no way exposed to plague infection. He was not an abstemious man by any means, but inebriety does not cause plague.

The children were not liable to contract plague at a Board School. When, however, we arrive at the mother, we find that she worked at a large rag store, and that she was undoubtedly the first victim of the disease. She worked among clean "cuttings" gathered in this country. But though the cuttings were clean, her surroundings were not of the most salubrious kind. For

instance, bales of rags were found on each of the big flats of the rag store, and many of these bales came from the Continent *viâ* Amsterdam. The mother informed me that she was greatly annoyed by the innumerable fleas she brought home from the rag store. These fleas did not necessarily come from the clean cuttings. Again, another interesting fact vouchsafed by her was, that several days before she left work she noticed two dead rats lying on the bench near where she worked. What became of these rats I was never able to discover. No other dead rats had been seen. The heads of the firm threw cold water on the rat story. Rats, they informed me, were often found dead after having been crushed by bales. That may also be true, but, knowing the affinity there appears to exist between plague and dead or dying rats, one is constrained to keep an open mind on this point. I am quite well aware that the rat and flea theories of infection are discredited. On the other hand, one is confronted with the unanswerable fact that plague bacilli do not lurk about the Leith streets nor about our Board Schools. No one can tell whence the rags came that reached Amsterdam and subsequently Leith. It will not suffice to negative the suggestion of rags as the possible carriers of infection. That infection may lurk in merchandise carried for long distances has been proved by instances quoted by Professor Simpson. He cites several cases where infected clothing, after being transported for long distances, ultimately led to the outcrop of cases of plague. Empty sacks taken from Bombay gave rise to plague infection far up country, and so on.

That the association of rats with plague is close, can scarcely be denied. In the Central Station Hotel in Glasgow one or more members of the staff developed plague, and when the floor upon which they stood was lifted, several rats that had died of plague were discovered. Coolies handling dead rats have been smitten with plague, whilst hundreds of blacks working under the same roof but not interfering with rats escaped the disease; and lastly, one must not forget that rag storgs were connected with the Glasgow outbreaks. Had there been a rat infection in Leith, there would have been something to show for it in the direction of rat mortality, and very probably more cases of plague. It may be argued that no dead rats were associated with the first Glasgow outbreak, yet there were thirty-three cases of the disease. Here, however, one must remember that had the first case of plague been timeously diagnosed in the west, there might have been no further spread of the disease. The fact remains that in the first family attacked with plague in Glasgow one of the members was employed in a rag store.

I do not intend to burden my contribution with a recapitulation of the sanitary measures adopted to combat the outbreak. For an important trading centre like Leith, much depended upon the early arrest of the disease. A spread of the disease even in a minor

degree would have seriously dislocated shipping. Several firms had tentatively made arrangements to make Granton their head-quarters.

Consequently great efforts were made to satisfy foreign authorities that every safeguard was being adopted to protect outgoing vessels and their crews. Every vessel was fumigated with sulphur prior to its departure, and when the holds were empty. The crews were medically inspected immediately before sailing, and during their stay at Leith guards were placed upon all mooring ropes and hawsers to prevent the passage of rats to and from the vessels. The residenters of the infected tenement were at once removed to the reception house, where they were detained for ten days, and medically examined daily.

At the end of five days, that being the time fixed upon by the Paris Convention of 1903, Leith was declared a free port. In the Venice Convention of 1897 the period was ten days.

The measures adopted at Leith freed all outgoing vessels from quarantine restrictions at foreign ports. This in itself was satisfactory. I did not follow the course of splashing quantities of disinfectant about the infected district, but rather aimed at securing cleanliness and airiness of interiors. In this work the lady attached to the department was of great assistance. Heaps of rubbish were removed from back yards, and all the alleyways limewashed with chloride of lime.

Lastly, there remained the destruction of rats. The crusade against them is at the moment of writing this still going on, and many hundreds have been destroyed in various parts of the town; but no plague infection has been found among these rats.

Acting upon the knowledge that the *Bacillus typhi murium* was pathogenic to rats and mice, the organism was culturally grown by Dr. Danysz, and when poured over bread rats and mice eat it, sicken and die. It is claimed that after eating the virus, such being its commercial name, an infected rat will spread the disease to others. On this point I cannot speak with confidence.

The Odessa authorities cleared the city of rats by using the virus. In Capetown the experiment was also useful. On the other hand, Professor Hunter Stewart and Dr. Chalmers of Glasgow do not speak encouragingly regarding their experiences with the virus. We have now been using the virus in Leith for some weeks, and I intend to continue its use, because several firms whose premises were overridden with rats have no hesitation in telling me that the difference in the numbers of rats since using the virus is perfectly patent. In fact, so impressed are they with the value of the virus, that, Oliver-like, they are asking for more. It may be a slow process, but it is a valuable one if pushed and systematically put into effect. I have myself seen the infected rats lolling about obviously sick and in distress. They appear to be dazed and lethargic. Their coats are roughened, and their bodies bloated.

When found dead—and numbers have been so found—their bodies are enormously distended. The only real objection that can be levelled against the virus is that rats dying of the infection have the awkward habit of breathing their last under the floors of dwelling-houses. The resulting stench is at once followed by complaint to the Public Health Department, but we have kept silent as to the cause of death.

Poisons such as phosphorus paste are good in their way, but other animals may reach the phosphorus. Rats are extremely cunning too. They may partake of the phosphorus to-night, but the experiences of the burning sensation created in their throats must be told to other rats, for phosphorus paste is for a considerable period left severely alone.

Most rat-catchers are a delusion. They may produce a few live specimens during the course of a week, but that is all. In Leith two rat-catchers were employed for three weeks, and the number of rats they caught was trifling. They can tell one where rats may be found, but that is all.

THE SURGICAL TREATMENT OF EMPYEMA.

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(PLATE VIII.)

WITH diffidence, though without apology, I venture to publish this essay, that from the consideration of one hundred consecutive cases of empyema, I may advocate the partial removal of one or more ribs as the routine treatment. For comparison it is necessary to have a series of cases of the same disease treated otherwise. I regret that I have been unable to collect cases equal to my own in number, but I have gathered what I could by the perusal of the records in the Dundee Royal Infirmary during the eleven years 1880 to 1890 inclusive. During that period twenty-nine cases only were submitted to surgical treatment, whereas my hundred cases occurred within seven years. This apparently increased prevalence, I have no doubt, is to be explained chiefly by the greater ability of the general medical practitioner in later years to recognise the condition, and to his appreciation of the advantages of early surgical treatment. In the twenty-nine cases the treatment consisted of—(1) Aspiration, (2) aspiration followed by incision, and (3) incision; and in my cases the treatment consisted of partial removal of ribs. Other points of difference will appear in the course of this paper, but in the meantime a general comparison of these methods of treatment are embodied in the following table:—

Method.	Mortality.	Average Stay of successful Cases in Hospital (Days).	Discharged with Sinus.
	Per Cent.		Per Cent.
Aspiration . . .	87·5	122	...
Aspiration followed by incision	62·5	108	62·5
Incision . . .	33·3	108	15·0
Excision of ribs . .	25·0	68	16·0

This table places the treatment by excision of ribs in the worst possible light, because in my cases all varieties of empyema are included, whereas in those I have used for comparison neither tuberculous nor chronic cases are found. It would be productive of very false conclusions were all varieties of empyema to be massed together, and, whatever other divisions may be considered justifiable, it is certain that a distinction should be drawn between chronic and acute empyema. This necessitates a definition of "chronic empyema," and this I would give as "an empyema where the pleura is so thickened as to require removal at the operation." One would be justified in subdividing each group according to the presence or absence of tuberculous disease of the lung. This subdivision I do not intend to adopt. Amongst my cases, 4 per cent. were examples of chronic empyema, and these I will reserve for separate consideration, except in sex, age, side affected, and preceding disease, which the chronicity of the illness cannot affect.

It is conceivable that the proportion between the sexes may vary in different localities according to the extent to which women are employed and the nature of the work. By examining the records of one hundred and thirteen consecutive cases admitted to the Dundee Royal Infirmary, I find that the proportion of women affected is slightly over 33 per cent., whereas in my hundred cases the proportion was 75 males to 25 females. The relation between sex and age is shown thus:—

	Males.	Females.	Total.
Under 5 years of age . .	20	13	33
Between 6 and 10 years . .	14	5	19
,, 11 ,, 20 ,, . .	10	2	12
,, 21 ,, 30 ,, . .	19	3	22
,, 31 ,, 40 ,, . .	8	1	9
,, 41 ,, 50 ,, . .	3	0	3
,, 51 ,, 60 ,, . .	1	0	1
,, 61 ,, 70 ,, . .	0	1	1
	75	25	100

The sexes are more equally affected at either end of life—at the commencement, when the clothing, habits, and environment, are practically the same, and in life's later days when the exposure is again very similar.

The right side was affected in fifty-two persons, the left in forty-five, and in three children the affection was bilateral. This accords with other observations, that the sides are affected with equal frequency. I also find that the mortality is greater in left than in right empyema (almost 2 to 1 in my cases).

Empyema is a sequel to some inflammation, and it is obvious that the prognosis must be affected by the nature and duration of the previous disease, and this again by the patient's constitutional tendencies. On the one hand, out of twenty-four fatal cases 29 per cent. had a distinct family history of tuberculous disease: and, on the other hand, out of seventy-two successful cases 13 per cent. had a distinct hereditary disposition to tuberculous disease, though a more thorough investigation might have raised the number in both divisions. The details of the illness preceding the empyema may be tabulated thus:—

Pneumonia	51, 8 fatal.
Pleurisy	17, 2 ,,
Phthisis	6, 5 ,,
Pneumonia during enteric . . .	1 fatal.
Broncho-pneumonia	1
Broncho-pneumonia with measles .	1 fatal.
Influenza	1
Scarlet fever	1
Pneumothorax	1 fatal.
Foreign body in the œsophagus . . .	1 ,,
Septicæmia	1 ,,
Vomiting and diarrhœa	1 ,,

In sixteen cases the previous illness is not recorded.

It seems a justifiable deduction that the longer it has existed the less likely is an empyema to close early: and though it is rarely possible to say the exact day on which an empyema began, such knowledge may be approached by considering the duration of the previous illness. The more acute the illness the less will be the possibility of error. In four, phthisis was the disease which preceded the empyema, its average duration in these patients being 285 days; and though empyema had developed during the latter part of the illness, it was not possible to say when it had come on.

The cause of death in twenty-four cases is shown in the following table:—

Phthisis	6
General tuberculosis	1
Tuberculous meningitis	1

Gangrene of lung (phthisis?)	1
Shock	5
Septicæmia	3
Cardiac failure	2
Endocarditis	1
Pericarditis	1
Nephritis with uræmia	1
Diarrhœa	1
Not ascertained	1

In five out of six fatal cases of empyema preceded by pneumonia, the average duration of the illness before operation was eighteen days: while in forty successful cases preceded by pneumonia the average duration was twenty-six days; which perhaps shows that the further the patient has passed through the attack of pneumonia before requiring operation, the better the chance of success. The case of general tuberculosis was that of a child who had been ill with pleurisy with effusion for twenty-seven days before operation, and died twenty-seven days later. In a child of 20 months old, measles and broncho-pneumonia had existed for thirty-five days before the empyema was operated on. He did not do well, and thirty-five days after operation he was removed home, where he died twenty-seven days later, presumably from septicæmia.

One of the cases of cardiac failure was that of a young man, æt. 20, who, after an illness of 120 days, arrived home from abroad said to be suffering from phthisis. No evidence of phthisis was found, but there was a right pyo-pneumothorax communicating with a bronchus, and though the operation only occupied a few minutes, death followed just after his return to bed.

One of the cases of septicæmia was a boy who developed a septic empyema from an infected wound in the neck made during the removal of tuberculous glands; and another was a child in whom at post-mortem examination a halfpenny was found, which had caused a perforating ulcer of the œsophagus.

Before passing to consider the operation and the factors which influence it, and before examining the cases and groups in further detail, I think it will conduce to the interest of the paper to state the results in tabular form.

Healed	56 per cent.
With a sinus when last heard of	16 ,,
Removed by friends and not traced	2 ,,
Transferred to another hospital	1 ,,
Died	25 ,,

In the treatment of empyema the points to be aimed at are—(1) Safety; (2) rapidity; (3) evacuation of contents of empyema (4) earliest possible obliteration of the cavity.

It is not advisable to discuss the operation under these heads separately, because they overlap, but simply to retain them as general guides. Of first importance is the question of the anæsthesia and the anæsthetic, for there is a widespread belief that this is specially dangerous. In all my cases the anæsthesia has been general and the anæsthetic chloroform. Local anæsthesia may be suitable in certain cases, though I would not advise it for a more extensive operation than simple incision, or at most removal of part of one rib. Ether appears to me to be too irritating to have preference, but I can quite imagine a feeble patient who would benefit by the administration of A.C.E. mixture. One claiming authority has recently stated that the action of A.C.E. is that of chloroform alone. To this I cannot agree, and I do not think that anyone could overlook, what a very small experience will show, that where under chloroform there is a tendency to deficient respiration and cardiac feebleness, the substitution of A.C.E. mixture is followed by improvement in pulse, respiration, and colour. If the patient be very weak, I give a little strychnine with or without digitaline hypodermically before operation, but I do not make a practice of it. It is specially desirable that in empyema the patient should have confidence in the anæsthetist, because excitement and fear are closely allied, and the latter I am convinced plays no small part in causing cardiac failure, particularly in children. The anæsthesia must be as short as possible, and therefore everything must be ready for the operation before the administration of the anæsthetic is commenced. The patient should not in any way be moved during or after the production of anæsthesia, because it causes movement in the fluid in the chest, and consequent alterations of intrathoracic pressure on viscera, nerves, or blood vessels, which may increase defective breathing or impeded action of the heart. It is imperative that the anæsthetic be given slowly and gradually, any choking, gasping for breath, or coughing being dangerous in proportion to the depth of the anæsthesia.

The patient lies on his back. Of course where the empyema is there the operation must be, but I am not dealing with localised empyema, and the physical conditions which obtain in the case of a large quantity of fluid do not exist with a small collection. As the patient becomes unconscious, the arm on the affected side is raised till the hand can be placed behind the head, and there it is steadied by an assistant or fixed with a bandage. The skin is rapidly cleaned with aetherial soap washed off with 1 per cent. lysol solution. I prefer to have a moist carbolic dressing on the side overnight or on the morning of the operation in adults, but would not delay the operation to obtain this. As soon as anæsthesia is sufficient, the anæsthetic is stopped, and the operation in an ordinary case can be completed without administering any more.

The incision I make in the middle, anterior, or posterior axillary

line, according to where the dulness reaches in the recumbent position. It is made at right angles to the long axis of the ribs, and is carried down to the bones at once, dividing some fibres of the serratus magnus muscle in its course. Though there may be a little bleeding from the long thoracic vein or some of its branches, it is seldom necessary to stop to catch the bleeding points, for the haemorrhage will cease when the chest is opened and the congestion relieved. With the left hand the wound is held open and the chest steadied, while the knife is drawn along one of the ribs to incise its periosteum. The knife is now laid aside and with an elevator the periosteum is raised from the bone, first from its outer side, then from its margins, and lastly from the inner surface. This done, the limb of a curved bone forceps is passed under the rib guided by the periosteum elevator, which is not till then withdrawn, and the rib is cut through behind. The free end of the rib is now raised by the left hand and the curved bone forceps again introduced, and the rib divided in front as far forward as necessary. This is repeated with as many ribs as it is desired to remove. The periosteum elevator is then thrust through the pleura and the pleura torn open by the fingers. The hand is then used to explore the size, site, and shape of the cavity, the thickness of the pleura and the condition of the lung. The cavity is emptied, swabbing or douching being employed if necessary. A broad piece of gauze is hung over the posterior lip of the incision through the whole of the extent, and the wound dressed with salicylic wool and a bandage applied. In a straightforward case, with an anæsthetist who knows his business, the operation from the commencement of the administration of the anæsthetic to the completion of the bandaging should take only a few minutes. This rapidity is desirable, because it causes a minimum shock, relieves the respiration and circulation as soon as possible, and puts an end as early as possible to the anæsthesia.

One of the first questions which rises in connection with the operation is: Should one wash out the cavity? It seems to me the indications are clear. The contents of the cavity are to be removed, and if the easiest way to do that is by washing, then wash. One has to be guided, too, by the condition of the pus. We may specify the varieties of pus found in empyema as:—

(*a*) Fœtid.
(*b*) Non-fœtid.
  (1) Thin.
  (2) Thick.
  (3) Coagulated.

Fœtor is a serious item in the prognosis. Of my cases 10 per cent. were fœtid, of which 8 per cent. occurred among the successful cases and 12 per cent. among the fatal cases. In two out of three fatal cases the patients died of gangrene of the lung, one on

the ninth and one on the eleventh day after the operation. In fœtid cases I recommend not only washing at the operation, but daily washing till the fœtor has disappeared. The majority of empyemata are due to infection by the pneumococcus, and it is a well-known fact that all effusions due to this organism show extraordinary tendency to coagulate and form fibrous exudation whether in the pleura, the peritoneum, in the joints or elsewhere. In empyema from such a cause coagula are to be expected, and about 60 per cent. of empyemata are due to pneumococcus infection alone. Through a simple incision or by aspiration, these masses cannot be removed, and if the cavity is to be emptied a correspondingly large opening must be made. Washing helps the removal of these coagula, though if a large enough opening be made the hand can be introduced and the coagula lifted out.

The principal point in connection with washing out the cavity is that the opening must be large enough to allow the fluid to flow out as rapidly as it is introduced, so that no undue intrathoracic pressure may be brought about. I wash out the cavity by pressing in the anterior lip of the incision with four fingers while lotion is poured freely in from a jug, and there is nothing to hinder it running out freely. The temperature of the lotion varies, but is generally about 105°; but if the patient is collapsed, hot lotion may be used, and is followed by improvement in pulse and respiration, as occurs in washing out the peritoneum.

The uselessness of special drainage tubes is proved by their multiplicity. I use none, a free opening obviates the necessity, and I believe a drainage tube may prevent the approximation of the parietal and visceral pleura.

The closure of the cavity depends on—

(1) The expansion of the lung; (2) the ascent of the diaphragm; (3) the falling in of the chest wall; (4) the return of the displaced heart in a left empyema.

The extent to which each of these participates varies with the size, site, and age of the empyema. In a small empyema, none of these factors may be required except the expansion of the lung, and a recent empyema anywhere may be obliterated by the expansion of the lung alone. An empyema may be in any part. It may be between the lobes of the lung, simulating a true pulmonary abscess; it may be between the lung and the diaphragm, or in any part between the lung and the chest wall. Previous adhesions may limit the empyema, and I am not sure that consolidation of a lobe may not direct the effusion to some other part. It is my opinion that apex-reaching empyemata are more common than is generally believed. There is still a general tendency to look for an empyema at the "most dependent part of the chest." Anatomically, in the supine subject, the most dependent part of the chest is posteriorly about the level of the ninth rib, below the angle of the scapula. This would be constant, did

patients always lie supine; but, apart from former adhesions and present consolidations, the most dependent part of the pleural cavity varies with the position of the patient. Age interferes with the factors which close the cavity, because the older the empyema the thicker the pleura, and the thicker the visceral pleura the more is the expansion of the lung interfered with. This thickening may also prevent the falling in of the chest wall even after removal of ribs. The recognition of this constitutes the difference between Estländer's and Schede's operations, and the interference with the expansion of the lung explains the utility of decortication. That the lung expands after decortication, when the thickened visceral pleura has been peeled off, proves that long compression of the lung does not end in alteration of the lung tissue unless in the presence of phthisis.

To the absence of changes in the pleura and lung tissue the expansion of the lung after thoracotomy bears an inverse ratio, and it must not be forgotten that between the lower border of the lung and the lower limit of the pleural sac there is a distance of two to four inches which the lung never reaches, and which consequently can only be obliterated by adhesion between the diaphragmatic and parietal pleura.

The vault of the diaphragm reaches during expiration as high as the level of the sixth rib or a little higher, and, with a little falling in of the chest wall to counteract the flattening of the cupola, the diaphragm is capable in itself of obliterating the cavity to that extent. The importance of this, from a surgeon's point of view, is that the contact between the diaphragm and the chest wall to the level of the sixth rib must not be interfered with, and that the insertion of drainage tubes below this level tend to the formation of a long sinus leading up to an obliterating cavity. The amount of falling in of the chest wall depends on the resiliency of the ribs, and where this is wanting, as in old people, it depends entirely on the amount of ribs removed. In the case of children and young adults, where the empyema is not chronic, the expansion of the lung is the main factor in the obliteration of the cavity: in cases of longer duration, this is assisted materially by the ascent of the diaphragm. In chronic cases, and in persons past young adult life, removal of ribs is necessary.

In my own cases, the site of the incision varied as follows:—

(1) In the anterior axillary line, nine times; (2) in the mid-axillary line, fifty-seven times; (3) in the posterior axillary line, six times; (4) in front of the anterior axillary line, once.

The ribs removed were preferably the fourth to sixth inclusive, but, if circumstances warranted, additional ones above and below were resected. The numbers of ribs partially resected in seventy-two cases were—

(1) In one case no ribs were primarily removed, because the

physical condition of the child did not warrant more than incision—five ribs were subsequently removed; (2) in one case one rib was resected; (3) in twenty-one cases two ribs were resected; (4) in thirty-five cases three ribs were resected; (5) in eleven cases four ribs were resected; (6) in three cases five ribs were resected.

For this method of operating, as a routine, I claim the following advantages:—

(1) Safety during operation; (2) rapidity and ease of procedure; (3) thorough evacuation of contents made certain; (4) safety and ease in lavage; (5) facility in subsequent dressings, the patient never having to sit up nor turn on the side; (6) thorough inspection of cavity and contents; (7) satisfactory drainage.

Against these, all of which no other operation can claim to fulfil, there is the only objection of greater shock to the patient. Therefore, admitting the superiority of a free opening with resection of ribs, incision would still be the proper treatment in patients who were much enfeebled from duration or severity of illness.

Incision alone leads to many secondary operations, because the wound closes before the cavity; and even in the extensive

Fig. 1.

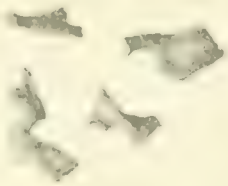

Fig. 2.

operation I advocate, second operations are found necessary, though less frequently than where incision alone is adopted. A second operation may be necessary for enlargement of the sinus, or for removal of sequestra. This was required in eight out of ninety-six cases—twice for removal of sequestra, and six times for delayed closure of the sinus. Excluding four chronic cases, a second operation was called for in one out of every twelve of my cases; whereas, among those treated by incision without division of ribs, which I have collected, a second operation was done in one out of every three and a half cases. Where a second operation was required for the removal of sequestra, it was in one case done on the 129th day, and in the other on the 280th day, after the primary operation. These sequestra (Fig. 1) are elongated, irregularly shaped pieces of bone, not unlike misshapen rib, and I have no doubt are formed from loose hanging pieces of periosteum. In my experience, small pieces of bone, of extreme irregularity (Fig. 2), are always to be found around the sinus during second operations. From their shape and size, it is evident

that they are not pieces of rib fractured at the operation, and, being clothed in periosteum, are not necrosed. Their presence seems to interfere mechanically with the closure of the sinus on rare occasions.

Secondary operation consists in the removal of the sinus and the ends of the cut ribs about it, and if necessary one or more contiguous ribs. In my six cases, the number of days which elapsed between the primary and the secondary operations was 72, 87, 22, 163, 48, and 80. The operations may be summarised thus:—

(1) Sinus excised, one case; (2) sinus and one rib above excised, one case; (3) sinus and one rib above and one below excised, one case; (4) sinus and two ribs above and one below excised, one case; (5) sinus and two ribs above and three below excised, one case; (6) sinus with two ribs above excised, one case.

This shows that though I make my incision higher up than is usually taught, yet, in cases where the healing was delayed, I had to remove more ribs from above than from below to get the cavity closed.

In only one case was a third operation required. This compares favourably with cases treated by incision alone, where 1 in 8 required a third operation. What is there to account for the delay in closing, for it is on that account that second or third operations become necessary? I believe the chief factor to be the duration of the empyema before operation. Two of my cases had been ill only twenty-eight days before operation. One of these patients had a fœtid empyema, and the other was a boy, æt. 14, in whom I underestimated the collapse of the chest wall which would be required, the lung and diaphragm taking less share in the closure of the cavity than I expected. A third case had been ill forty-five days with a fœtid pyo-pneumothorax. Another had been ill forty-nine days, and had albuminuria, from which he gradually recovered after the thoracoplasty. The remaining two patients in whom closure was delayed had been ill fifty-six and sixty-four days respectively. It is apparent that every one of these has some feature to place it without the pale of promising cases. It is to be expected that fœtid empyemata take longer to heal than cases in which fœtor is absent, for the illness is much more severe and the constitutional disturbance more serious. In the above cases of delayed closure, three out of six were fœtid. Rickets, tuberculosis, inherited syphilis, an unusually severe or prolonged illness, the presence of some debilitating affection such as albuminuria, or the development of an intercurrent disease, tends to interfere with the straightforward healing of the case. Perhaps, with greater numbers, second operations might be found to be more frequent in adults than in children, but my cases are too few to warrant a deduction on this point. The ages in the six cases were 3, 14, 28, 28, 30, and 42 years. Allied to delayed

closure are those cases which had a sinus when last heard of. Amongst my cases they numbered nineteen. Two children were removed from hospital by their relatives against advice on the fourteenth and ninth day of residence. A patient who was "transferred to another hospital" was a man, æt. 22, who came under my care in Standerton, Transvaal, during the South African War. He had a left empyema twelve days after pneumonia, and was doing well on the thirty-second day after operation, when he had to be transferred, as we were changing camp. I have no doubt that this man ultimately healed, and I regret I am compelled to include him in this part of my statistics. A similar regret exists in relation to two patients discharged "almost healed" in whom the wound was superficial, and I have no doubt that had the wound not rapidly skinned over they would have returned for advice. As it is, I have been unable to trace either. In addition to these, fourteen patients were discharged with the wound not healed: that is to say, of empyemata treated without interference from patients or friends, 16 per cent. were discharged with a sinus. It is highly probable that these cases ultimately did well. With one exception, they were discharged because they were doing well, were almost healed, and there was no apparent reason why they should not continue to do well. There is often a temptation to send such cases home not quite healed to make room for other patients in hospital, and this is more justifiable than formerly, since patients of this class can obtain the services of the district nurses if unable to attend the out-patient department of the hospital. The average duration of the illness before operation in these fourteen cases was forty-two days, being twenty days longer than the duration of the illness in those cases which healed without delay, and five days longer than in those cases where a second operation was required.

In only one of these cases with persistent sinus was a second operation performed. It was that of a patient, æt. 10, who after a twenty-eight days' illness was operated on for a fœtid left empyema, and portions of the seventh, eighth, ninth, and tenth ribs removed through an incision in the posterior axillary line. Seventy-two days later the sinus and the ends of the surrounding ribs, with portions of the fifth and sixth ribs, were removed. The prolongation of this case may be ascribed to the fœtid condition of the empyema, and to the operation having been performed too low down the thorax. As other typical examples of cases which heal slowly and are apt to end in sinuses, I give these four:—

Case 1.—A child, æt. 2 years, had been ill with a right empyema for seventy days before parts of the fifth, sixth, seventh, and eighth ribs were removed in the anterior axillary line. After a residence of twenty-nine days in hospital, she was discharged not doing well, the cachectic condition into which the child had passed before operation still existing.

She returned, however, seven months later, in good health and with the sinus almost closed.

Case 2.—A boy, æt. 8 years, had been ill for ninety days before operation. The fifth, sixth, seventh, and eighth ribs were resected in the anterior axillary line for a right empyema. He was in hospital for one hundred and seven days, and was known to have a sinus two and a half years later. The prolonged illness before operation was the probable cause of the slow progress.

Case 3.—A young man, æt. 22, was operated on forty-two days after the commencement of his illness. Parts of the fourth, fifth, sixth, seventh, and eighth ribs were removed in the left mid-axillary line. He had albuminuria, and had been aspirated three weeks and again two weeks before operation, pus having been obtained each time. He left hospital at his own request seventy-six days later.

Case 4.—A little girl, æt. 6 years, was admitted to hospital with a left empyema on the seventy-eighth day of her illness. Two inches of the fourth, fifth, and sixth ribs were removed in the mid-axillary line. She was one hundred and four days in hospital when the sinus with the contiguous rib-ends was excised, and a large sequestrum (Fig. 1) was removed on the two hundred and eightieth day after the first operation. There was a family history of tubercle, and the child had never been robust. She was known to have a sinus three and a quarter years after her first operation.

"How long is it after operation before the wound will be healed up?" is a question often put by patients or their friends. To answer this question is not easy, and it is impossible to say the exact day on which the wound healed. It must not be admitted to be healed till quite skinned over. It is inconceivable how difficult it is to get accuracy on this point, unless the patient has been under one's personal observation till the very end of the illness. I have been able to trace or watch thirty-three cases, and I find that the average duration after operation is forty-one days. There was a slight difference between the two sides; eighteen were right-sided empyemata and averaged thirty-seven days, while fifteen were left and averaged forty-six days after operation. Some of these healed cases merit remark on account of their persistence, but the first one I give on account of its short duration.

Case 5.—A child, æt. 2 years, had been ill for twenty-one days with a left empyema, for which portions of the fourth, fifth, and sixth ribs were excised and the pus and coagula turned out. The displaced heart at once returned to its proper place and the lung expanded fully. No drainage was required. The wound was dressed twice, and on the tenth day was found closed. Without the removal of the coagula, it is not possible that the parietal and visceral pleura could have come into contact so thoroughly, and the coagula could not have been removed without the excision of the ribs and the formation of an adequate opening.

Case 6.—A girl, æt. 5 years, with a right empyema, of which the

only history obtainable was that four days before admission to hospital 56 oz. of pus had been withdrawn by aspiration, had parts of the sixth, seventh, and eighth ribs removed in the axillary line. The sinus and surrounding ribs were removed one hundred and eighteen days later, and the wound was entirely healed on the one hundred and fifty-ninth day. The complication which delayed the healing was evidently the duration of the empyema before operation.

Case 7.—A man, æt. 30, of delicate appearance, though without definite tuberculous family history, had been ill for fifty-six days previous to admission, with a left empyema which formed a pulsating fluctuant tumour in the anterior axillary line between the sixth and seventh ribs. Portions of the fifth, sixth, and seventh ribs were resected, and much pus removed, along with coagula of such size that difficulty was experienced in removing them through the large opening. The lung showed no sign of expanding. On the eighty-seventh day after the first operation, I removed the second to the ninth ribs inclusive from their angles to their cartilages. The pleura was found to be $1\frac{1}{4}$ inch thick, and was removed over the same area as the ribs. He was healed on the one hundred and twenty-eighth day (Plate VIII. Fig. 1). As in the previous case, the complication was probably the long duration of the empyema before operation.

Case 8.—A boy, æt. 4 years, had suffered from a right empyema for fourteen days. Parts of the fourth and fifth ribs were removed, and, convalescence proceeding normally, he went home on the seventy-sixth day, but returned later with a sequestrum lying loose among the granulations. This was removed with forceps, and the wound healed on the one hundred and fortieth day. The delay in closure was undoubtedly caused by the sequestrum.

Case 9.—A child, æt. 5 years, took ill with pneumonia forty-two days before admission to hospital. A right empyema was pointing in the posterior axillary line between the sixth and seventh ribs. It had been tapped fourteen days before admission, and fluid removed. The physical condition justified incision only. Thirty-two days later parts of the sixth and seventh ribs were removed, and on the one hundred and twenty ninth day the fourth to the eighth ribs were freely removed. The wound was not closed till the four hundred and forty-sixth day, the delay being due to the physical deterioration produced by the long existing empyema.

Case 10.—A man, æt. 28, of tuberculous tendencies, had been ill for forty five days with a right pneumonia followed by empyema, which had formed a pyo-pneumothorax. Four inches of the fifth, sixth, and seventh ribs were removed in the mid-axillary line. The empyema was an apex one, and on the one hundred and sixty third day, the sinus, with the ends of the surrounding, and the third, fourth, and eighth additional ribs, were removed, and the wound was healed on the one hundred and ninety-second day.

Case 11.—A lad, æt. 14 years, had been ill for twenty-eight days with a left empyema following pneumonia. Parts of the fifth, sixth, seventh, and eighth ribs were removed in the mid-axillary line. The lung did not expand as I expected, and on the forty-eighth day the sinus and surrounding rib-ends were removed, and the wound was healed

on the one hundred and fiftieth day. There appeared to be an unusual want of resiliency in the chest wall in this patient.

Case 12.—General debility delayed the healing in the case of a boy, æt. 3 years, who, forty days before admission, had developed scarlet fever followed by nephritis, but it was not clear when the empyema had supervened. Parts of the fourth, fifth, sixth, and seventh ribs were removed in the right mid-axillary line. On the eightieth day, the sinus, with the cut rib-ends about it and part of the third rib, were removed. The cavity extended towards the apex, and the wound healed on the one hundred and forty-fifth day. Before the second operation he had a peculiar spasmodic cough, very suggestive of whooping cough, which at once and permanently disappeared after the operation.

That a pulmonary fistula is followed by delay in healing is shown by the two following cases:—

Case 13.—A married woman, æt. 36, took ill with a right apical pneumonia. It was a sharp illness, and after improving a little she relapsed, and on the eleventh day began spitting up blood and fœtid pus. On the fourteenth day of the illness I removed two inches of the fourth, fifth, and sixth ribs in the posterior axillary line, and found a very fœtid empyema occupying the apex of the pleural cavity. Six months later the wound healed, and this was followed by a rise of temperature and some slightly fœtid hæmoptysis. The cicatrix bulged and burst, and, being kept open by plugging as long as possible, ultimately healed soundly on the two hundred and fortieth day.

Case 14.—A man, æt. 25, of rather intemperate habits, was transferred to my care from one of the medical wards, suffering from right empyema following pneumonia. He had been ill for forty-nine days. Parts of the sixth, seventh, and eighth ribs were removed in the mid-axillary line, and a quantity of thick reddish pus removed. The lowest lobe of the lung felt solid, and occupied the back part of the chest. The discharge continued for a month or so, peculiarly reddened with blood, and then became brownish. He went home at his own request, almost healed. Two days later he was readmitted, with toxæmic swelling of the wrists and ankles. These untoward symptoms vanished as blood-tinged expectoration and discharge reappeared. In six weeks the discharge lost its red colour, and two weeks later he was again practically healed. He then suddenly developed slight hæmoptysis with pains all over, and swelling of the wrists, fingers, and knees, and a temperature of 102°. A probe, passed carefully through the healed wound in the direction of the empyema, entered, at three inches, a small sanguineous abscess. His hæmoptysis and cough at once ceased, and he continued to do well till the wound was finally healed on the one hundred and sixty-fifth day.

Case 15.—A boy, æt. 10 years, of poor physique and tuberculous tendencies, had been ill for sixty days. Parts of the third to the seventh ribs were removed in the mid-axillary line, and the lung found collapsed and the pleura thick and covered with fibrin and coagula. In the course of his convalescence he developed scarlet fever, and the wound was not closed till the two hundred and sixtieth day.

These cases show that delay in healing is not brought about

without some definite cause, and they illustrate some of these causes.

Four per cent. of my cases were chronic when they came under my observation. In brief detail these cases afford points of interest. The first was a man, æt. 41, who gave a history extending over four years. The empyema succeeded a left pleurisy with effusion following influenza. Four days after the onset he was tapped, and "two and a half bottles of fluid" removed. He was then aspirated once a week for four weeks, and then on two occasions a hypodermic needle was inserted, and on the last occasion "the doctor said the fluid had now become matter, and something else would have to be done." Two days later an incision was made "at the base of the left lung," and 34 oz. of pus were removed, and two drainage tubes inserted. After two months the tubes were left out, and this was followed by a rise of temperature, necessitating enlargement of the sinus and reintroduction of the tubes. Three weeks later he first came under my care. I removed pieces of four ribs, and in seven months he went home with a sinus. Nineteen months thereafter, in a much improved physical condition, he was readmitted to my care in hospital, and I removed the second to the ninth ribs with the thickened pleura. He went home after forty-seven days in hospital, and I hear that he is now well and working. I do not fear contradiction when I say that this case became chronic on account of the delay and inefficiency of the earlier treatment.

The second was that of a man, æt. 36, who, when I saw him first, had a left empyema of three years' duration. Though there was no history of tubercle in the family, his illness began with an ordinary attack of pulmonary phthisis, for which he was treated, and a year later he had a severe attack of pleurisy. A month or two after his recovery from this, he noticed splashing in his chest when he walked. In June 1897 he was aspirated, 106 oz. of turbid purulent fluid being withdrawn, and next day 100 oz. similarly removed. He was aspirated twice with benefit in September of the same year. Just before being sent to me, in December 1898, he had been tapped of 44 oz. of thick pus. Six days later I removed four inches of the third, fourth, and fifth ribs in the mid-axillary line, and evacuated a large quantity of pus. Fourteen months afterwards I removed the second to the tenth ribs inclusive, along with the thickened pleura over this large area. The pieces of ribs removed varied from two to nine inches. Soon after that he returned to his work, though the sinus was not healed. I reopened the sinus nine months later, and, finding a considerable cavity at the apex, removed two to three inches of the anterior parts of those ribs which had been cut before. The cavity then closed entirely, and in six weeks he returned to his work. Until recently, when I saw him again, he had been constantly at work, and weighed fourteen stone, and he had ex-

FIG. 1.

FIG. 2.

FIG. 3.

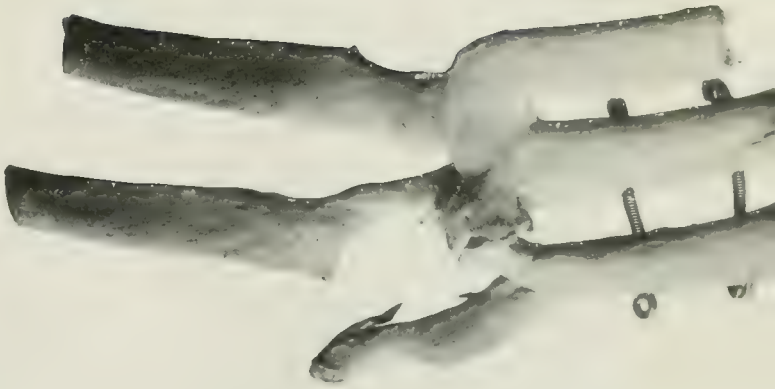

FIG. 4.

perienced no discomfort except breathlessness on unusual exertion. The condition of his chest is shown in Plate VIII. Figs. 2 and 3. Though the delay in the treatment of this case was probably the cause of the empyema becoming chronic, it also played no small part in the healing of the phthisis in the lung. I do not think the surgical interference would have been attended with the same happy result had it been carried out while the phthisis was active.

The third case was also a man, æt. 36, with a left empyema. In July 1896 the chest was aspirated, and later incised and drained. Three weeks later two ribs were partially removed, to facilitate drainage, and he was in bed for seven months. A counter opening was made in January 1898, and the wound healed in April. He was sent to me in March 1899, because a few weeks previously the wound had broken down, and was again discharging pus. I removed the sinus with the surrounding ribs (Plate VIII. Fig. 4), and the fourth to the tenth ribs inclusive, from their cartilages to their angles. Even with this extensive resection, the sinus which remained had to be reopened and enlarged five months later before the cavity completely closed. He has remained well and at work since.

The last case of chronic empyema which I include in my series was a man, æt. 25, whose empyema apparently began with a right pleurisy fourteen months before I saw him. The existence of fluid was overlooked, and apparently the case treated as one of phthisis. For three months at least before I operated on him, he had been coughing up huge quantities (up to 37 oz. daily) of fœtid expectoration. I resected about four inches of the fourth to the eighth ribs inclusive, and found a thick-walled cavity, extending from the apex to the sixth rib, containing very thick greenish-yellow pus. The lung was much retracted, and there were bands of fibrous tissue stretching across the cavity. The communication between this cavity and a bronchus was quite apparent. He was much relieved by the operation, but six weeks later developed symptoms of cerebral abscess, and died.

Notwithstanding the untoward result of the last, these cases illustrate well the great benefit to be expected from surgical interference in cases of long-standing empyema, provided the operation be extensive enough and there is no active phthisis.

In conclusion, I wish to repeat that the most satisfactory results in the surgical treatment of empyema are obtained in chronic or acute cases by a free opening into the chest, with excision of ribs in the axillary line at the earliest possible moment. The only exception to this is when there is active phthisis present. Fifty-two per cent. of my cases occurred in children, and though my figures are few, I find that under 30 years of age the proportion of deaths is 1 in every 4·13, while above 30 years of age it is 1 in every 3·15, and this includes all cases, even phthisical ones, where the recovery from the empyema depends on the

curability of the phthisis. To quote the mortality table with which I opened this essay :—

The mortality after aspiration is	. . . .	87·5	per cent.
,, ,, aspiration followed by incision is		62·5	,,
,, ,, incision alone is	. . .	33·3	,,
,, ,, excision of ribs is	. . .	25·0	,,

Taking together all the cases I have gathered in a previous decade, not before the days of antiseptic treatment of wounds, the mortality reaches 48·27 per cent., with which my 25 per cent. mortality, after excision of ribs, compares favourably.

I need not recapitulate the other points which I have dealt with throughout the paper, but I will refer to three points only. First, in cases where ribs are removed, a second operation is required in 10 per cent., but in cases where this is not adopted, a second operation is required in 66 per cent. Second, that in hospital cases treated by other treatment than by excision of ribs, the average stay of each patient in the institution is one hundred and eight days: it is lessened to sixty-eight days in cases treated by excision of ribs. Third, that in a straightforward case, without any complication, in a young adult or child, the average duration of the wound after operation is fifty-three days.

GALL STONES.

By Rutherford Morison, F.R.C.S., *Surgeon to the Royal Infirmary, and Consulting Surgeon to the Dental Hospital, Newcastle-on-Tyne.*

Statistics.[1]

Cholecystotomies, seven cases; all recovered.
Cholecystostomies, eight cases; all recovered.
Cholecystectomy, one case; recovered.
Choledochotomies, five cases; one recovered, four died.
Gall stones not operated on; two cases.

Of the twenty-one cases operated on, seventeen recovered and four died.

Ten years ago, in introducing a discussion on gall stones,[2] I made some suggestions, based on general principles of surgical pathology, as to the causes of the symptoms and the physical conditions met with in cases of cholelithiasis. Time has only served to convince me of their truth and usefulness; and as they have not yet received the recognition which I think they deserve, I intend in the present paper to restate them, together with my conclusions

[1] Statistics supplied by G. Grey Turner, Surgical Registrar, Royal Infirmary, Newcastle-on-Tyne, of cases of gall stones operated on by Mr. Morison during 1903 in the Royal Infirmary and in a private hospital at Newcastle-on-Tyne. Drawings by W. G. Richardson, F.R.C.S.

[2] *Jour. Northumberland and Durham Med. Soc.*, 1895, p. 21.

based upon them, and to add any further observations that have since occurred to me.

"Gallstone attacks" are amongst the most painful of human ailments, and once they have occurred they are apt to be repeated at frequent intervals. On the contrary, gall stones may be present in the gall bladder for long periods without giving rise to any appreciable symptoms.

In searching for an explanation of these apparently contradictory facts, I remembered the behaviour of the urinary bladder in the presence of stone. Every surgeon knows that a large urinary stone which has taken years to form may be found with symptoms of only a few weeks' duration; and that, notwithstanding the presence of a stone, such marked amelioration of the bladder spasms and pain may follow relief of a coexisting cystitis, as to prove that the inflammation plays a very important part in the production of the characteristic symptoms. Like gallstone attacks, "attacks of gravel" are liable to recur; for in both they are due to cystitis, of which the stones are the predisposing cause, and the complete and permanent cure of the cystitis, so long as the irritating calculi are present, is improbable.

The terrible pains of gallstone attacks I attribute to the well-known physiological qualities of unstriped muscle. Its forcible contraction causes the most excruciating pain, of which labour pains are the best known example.

The first facts noted were—

1. That gall stones may be present and cause no symptoms;

2. That once symptoms have occurred, they are likely to recur; and

3. That gallstone attacks are excruciatingly painful.

My interpretation of these facts is as follows:—

1. That in an uninflamed gall bladder, gall stones may lie undisturbed, and cause no symptoms.

2. That cholecystitis is the necessary irritant.

3. That when cholecystitis accompanies the presence of gall stones, the vigorous and repeated efforts of the gall bladder to expel its contents by forcible contraction of its unstriated muscular coat are the cause of the pains peculiar to gallstone attacks.

A few years later I learned, from a case in which I had excised the gall bladder, and in which gall stones recurred, that the characteristic pains might be present though the gall bladder was absent. When I met with this case, the fact that the common bile duct, like the gall bladder, possesses unstriated muscle in its walls, had hitherto escaped my attention.

Another fact noted was that serious results are scarcely at all due to the hundred more or less stones in the gall bladder, but to the one or more driven into the ducts. This is a point apt to be forgotten even now, judging by current literature, with its history

of stones escaping *after* operation; stones which must have been left in the ducts, for in the gall bladder they can scarcely be overlooked.

The urinary bladder resembles the gall bladder more, perhaps, than any other hollow muscular-coated viscus, but all hollow viscera respond similarly to the stimuli of irritants. In the consideration of special diseases, sufficient importance is not, to my mind, attached to general surgical principles; even the details of these can be understood and explained if due consideration be given to the behaviour of the hollow viscera as a class. The fashion also of attributing every result, when inflammation is present, to the ravages of organisms, has hindered the progress of pathology almost as much as it has advanced it.

The first fact we learn from consideration of the behaviour of the gall bladder, the urinary bladder, the intestines, the vermiform appendix, the stomach, and the Fallopian tubes, is that violent contractions intended for the expulsion of their contents are accompanied by severe pain, and, when acting against a partial obstruction, these contractions are followed by hypertrophy of their walls, and, later, by diminution of their cavity.

The next fact is that, if they find the obstacle insurmountable, the muscular coats cease to contract, the violent pains abate, paresis of the muscular coat occurs, and is followed by passive distension of the viscus, and, later, degeneration of the unstriped muscle, and inflammatory changes in the viscus, may produce profound alterations in it. This explains hydrops of the gall bladder distended by its own secretion, the distended gall bladder of malignant pancreas, painless urinary retention with passive overflow, painless distension of the cæcum following obstruction to the sigmoid flexure, hydrops of the vermiform appendix, the enormous painless distension of the dilated stomach from obstructed pylorus, and hydrosalpinx following occlusion of the Fallopian tubes.

The next fact learnt is that, given complete obstruction with an active inflammation superadded, the intravisceral tension may become so acute that partial or total gangrene of the involved viscus, followed by its rupture, will occur. In the gall bladder such a gangrene appears first as a patch at the fundus, and gradually spreads, if the tension is not relieved by rupture, so as to involve the whole body of the gall bladder. That such a rupture of the gall bladder is not purely mechanical, is proved by the fact that the artificially distended gall bladder tears towards its neck. That the site of gangrene is determined by the vascular supply, is made evident by consideration of what happens in the urinary bladder, the appendix, and the cæcum. In a young man, æt. 25, admitted to the Royal Infirmary, Newcastle, 20th December 1888, suffering from retention of urine of four days' duration, due to a gonorrhœal prostatic abscess and excessive

whisky drinking, I found his peritoneal cavity distended with urine, which had escaped through "a small opening scarcely as large as a split pea, of grey ashy colour, at the superior portion of the posterior wall of the bladder" (*i.e.* the portion furthest from the main supplying arterial trunks). Gangrene in the inflamed and distended appendix, strictured near the cæcum, commences on the convexity and near the tip (a point furthest from the vascular supply). Gangrene of the distended cæcum commences by small round patches in the neighbourhood of the anterior longitudinal band (furthest from the vascular supply). Acute perforating ulcers of the stomach are found in a line midway between the greater and lesser curvature, *i.e.* furthest from the vascular supply.

A special note is necessary to explain Dr. Drummond's and my own view as to acute perforating gastric ulcer. It is that spasm of the pylorus often causes acute stomach distension of a temporary character. In one of these attacks the ischæmic patch resulting is so seriously damaged that gangrene of it follows. In the course of a few days, separation of the gangrenous patch results in perforation.

In all these instances I regard the gangrene as resulting from tension. The tension in all is mainly due to inflammation. But this is not, as is now generally taught, an invariable rule. For example, in a case of total gangrene of the cæcum following prolonged and complete obstruction due to malignant stricture of the sigmoid flexure, I found neither clinical nor pathological evidence of inflammatory phenomena. It is not true that gangrene always results directly from the attack of virulent micro-organisms. There can be no doubt that some rare forms of gangrene primarily result from infection by specially virulent organisms; but in the common variety of gangrene I shall continue to believe, till stronger evidence to the contrary has been offered, that interference with the vascular supply is the primary cause, and that organismal infection plays a secondary part. In other words, it is not until the tissues have been weakened by interference with their vascular supply that they afford a fit soil for such infection.

When I was a student, the greatest importance was attached to the presence of cystitis when operating for vesical stone. Crushing had to be done very gently, very little at a time; and the cystitis received every possible attention.

Gallstone surgery is in the same stage to-day; all the authorities engage chiefly in discussing the causes, the progress, the consequences, and the treatment of the inflammation, and neglect the stones. In the case of the urinary bladder, I recall the shock the surgical world received when Bigelow of Boston announced[1] that if the stone or stones were removed, the cystitis

[1] *Amer. Journ. Med. Sc.*, Philadelphia, January 1878.

would promptly get well. How long will it take surgeons to recognise that the same is true of the gall bladder? In both, exceptions occur to the rule, but they are rare.

Inflammation of the gall bladder differs in no respect from inflammation elsewhere. The presence of stones is a predisposing cause, which favours the development of inflammation. Cholecystitis not accompanied by the presence of stones is rare. It occurs, however, in typhoid fever and other intestinal infections, and occasionally a blood infection may cause it. The exciting cause of all serious forms is infection by a pyogenic micro-organism: the possible terminations of all are by—(1) resolution, (2) fibroid thickening, (3) partial destruction (ulceration and sloughing), (4) total destruction (gangrene). To describe the possible terminations of inflammation as distinct clinical varieties under such names as catarrhal, phlegmonous, and gangrenous cholecystitis, is to add to the difficulty of clear thinking, and to bar progress. To show the importance of grouping together similar structures, in order to understand pathological possibilities, I may mention that though I had not read of, or heard of, one elsewhere, I was for a long time on the outlook for a sacculated gall bladder, and eventually found one. Sacculation of the urinary bladder is well known. Sacculation of the intestines, especially of the colon, had been recognised. I have drawn attention to the fact that similar changes are found in the gall bladder, the vermiform appendix, and the Fallopian tubes. The exact pathology of all is obscure; but it seems probable that they will all be found to have, as in the case of the urinary bladder, some relation to inflammation of the walls, and partial obstruction of the outlet.

The biliary ducts compare in many points with two other small muscular tubes, whose behaviour is known, the ureter and the urethra. All of them, when irritated by the passage of a foreign body, are likely to contract spasmodically on the intruder, so that a small stone may temporarily form a complete obstruction. At a later stage the walls of the muscular tube recede from the foreign body, and active dilatation follows. Intermittent jaundice and attacks of temporary hydronephrosis may be produced respectively by a stone lying in the bile duct or in the ureter.

With these general facts as guides, the diagnosis and prognosis of gallstone cases is made easier.

Diagnosis.—It has already been stated, and indeed the fact is generally admitted, that uncomplicated gall stones may lie in the gall bladder and produce no symptoms. Their diagnosis then is not likely to be possible, nor is it of practical importance. The earliest recognisable symptom of gall stones, and one consequently of great importance, is usually described in popular language as an "attack of spasms," and the "attack" is generally referred to

the stomach.[1] The sudden and severe character of the pain are its chief features. Often the pain can be fairly localised over the position of the gall bladder, and, after it has passed off, it invariably leaves marked tenderness on pressure over the gall bladder.

Such an attack may produce no change in the anatomical position of the stones, or it may drive one or more into the neck of the gall bladder, or through it into the cystic or common ducts, through which it may escape into the duodenum, to be passed in a few days with the fæces. A large number of small stones are not infrequently passed in this way.

The diagnosis in these cases is based upon the history of "spasms," and upon the tender spot, found by pressing the finger tip over the gall bladder at a point at the outer edge of the right rectus muscle, opposite the ninth costal cartilage. Other conditions, producing the same symptoms, are pyloric ulcer and appendicitis, if the vermiform appendix lies under the liver, as it does when the cæcum has failed to descend. I know of no means of distinguishing these from attacks due to gall stones, and have recently, with a full knowledge of the possibilities, operated for gall stones, to find a pyloric ulcer and an inflamed subhepatic appendix. The same uncertainty of diagnosis will be felt in all cases when reliance has to be placed on the history, and physical signs are absent or of doubtful value.

If stones are passed into the duodenum, a history that shivering and vomiting occurred, and that jaundice followed after some of the attacks, will probably be obtainable.

Pancreatitis in some cases so closely simulates gallstone attacks as to make diagnosis impossible. In many of these cases the intermission of the pains and jaundice can only be explained by the view that a temporary increase of the pancreatic swelling causes for a time obstruction of the common duct, and this explains the fact, which I have not previously seen noted, that the gall bladder may be thick-walled and contracted, whereas when the obstruction is complete, as in cases of pancreatic tumour, the gall bladder is thin-walled and distended, and the jaundice permanent. In a case recently operated upon, the history of a sudden commencement with agonising pain, followed by jaundice, and repeated similar attacks, led me to make a diagnosis of gall stones and pancreatitis, because I was able to feel definitely the hard, nodular, enlarged, and tender pancreas; but operation showed that there were no gall stones, and no signs, such as adhesions or thickened ducts, that there had been any. There was only a pancreatitis, the cause of which was not discovered. The size and condition of the gall bladder may be of considerable diagnostic value in these pancreatic cases, for it is impossible from examination of the hard, enlarged, nodular pancreas to say whether the infiltration is due to malignant or inflammatory

[1] *Loc. cit.*

deposit. A small gall bladder favours the diagnosis of simple, a large one that of malignant change in the pancreas.

If a large stone is firmly driven into and completely blocks the neck of the gall bladder, or the cystic duct, the attack is attended, as a rule, by unusually severe and long-continued pain, which only gradually abates, as distension-paralysis of the muscular coat of the gall bladder develops. Sooner or later after this attack, the swollen tense gall bladder will be discovered as a tumour below the ninth costal cartilage, in a line between that point and the umbilicus.

This tumour has been mistaken for many other conditions, but the chief error made is in confounding it with a movable kidney, about which much mischievous nonsense has been written, for it is very seldom the cause of serious symptoms.

The chief diagnostic points are—That *movable kidney* is most often found in thin, nervous women before forty, and that the health is not seriously impaired. The swelling is not easily felt with one hand on the anterior abdominal wall, and patient breathing quietly. Pressure on the swelling produces sensation characteristically disagreeable. The swelling slips back into the kidney region easily and completely, and remains there when the patient is recumbent, unless disturbed by bodily or respiratory movements. It is freely movable in every direction.

A *tumour of the gall bladder* is most often found in fat women after forty, and there is a history of loss of flesh and strength. The tumour is tender when pressed upon; is felt close to the anterior abdominal wall, and moves with respiration. It has to be coaxed into kidney region; it never disappears, and will not remain there unless artificially retained. It is moored at its upper part.

On *bimanual palpation*, in the case of *movable kidney*, the swelling is flattened, solid, but not hard. The swelling is jerked down by forced inspiration; it is easily detained by the hands pressed together above or below it, and it is apt to jerk suddenly back again when the pressure is relaxed. The loin feels hollow when the swelling is in the abdomen.

The *distended gall bladder* is rounded; it feels very hard, because it is tensely distended with fluid; the tumour descends steadily and aggressively on forced inspiration, and it ascends vigorously on expiration against any obstacle. The kidney may be felt behind, and independently of the tumour.

On *percussion*, there is a tympanitic note over the renal swelling, while in distended gall bladder the note is dull over the tumour, and the dulness is continuous with that of liver.

The tumour, as I have said, may be discovered sooner or later after the attack, and in some cases may be the seat of most acute and dangerous mischief: whilst in others the trouble it occasions is so slight, and the changes in it are of such a chronic

character, that it may only be discovered accidentally in the course of a complete examination. Midway between the severe and the mild cases there is a third type, less acute than the first, but more serious than the second, attended by purulent infection of the contents of the distended gall bladder.

In the most severe type, a few hours after the commencement of the illness, the swollen, very tender, and tense gall bladder may be felt as a hard tumour, and the patient looks very ill. The temperature and pulse are both quickened, vomiting and thirst are present, the vital powers are much depressed, and acute

FIG. 1.—Sacculus of gall bladder, from old gallstone case.

FIG. 2.—Perforated gall bladder, with omentum, in which a gall stone has become encysted, blocking the perforation. The gall bladder was very thick, and of hour-glass shape.

pneumonia is a frequent complication. The general condition is that produced by acute septicæmia; the local condition one of gangrene of the gall bladder. There can be little hesitation in attributing the severity of the attack to the presence in the gall bladder of virulent organisms, favoured in their growth by conditions not yet understood. One of these conditions I believe to be the presence of a quantity of fluid bile in the gall bladder, which I have always found during operation on these cases. It appears to me probable that a gall bladder filled with bile, when impaction of a stone occurs, is more likely to form a suitable incubator for germs, and to develop acute mischief, than one

which has been thoroughly emptied by contraction before complete impaction of the stone occurred. In this case the gall bladder becomes distended by its own secretion, which probably, like other mucous secretions, contains some antiseptic principle, and this may account for the frequent absence of suppuration of its contents.

In the second class of case, the distended gall bladder contains pus. The diagnosis is based chiefly upon the tenderness of the tumour, which never disappears; on its becoming more indefinite in outline from omentum adhering round it; from increasing uneasiness and weakness, though these may not be marked features; and upon recurring rigors, night temperature and sweatings, though neither is invariable.

In the third class of case, in which the gall bladder is distended with clear mucoid fluid, a diagnosis may be based on the history of preceding "spasms," on the freedom with which the swelling can be handled, its definite outline, its position and relations, and its free respiratory mobility.

Prognosis of Gall Stones in the Gall Bladder and Cystic Duct.—The medical profession has been slow to recognise that gall stones are a serious possession, and that the prognosis in every case is uncertain.

Doubtless spontaneous cures occur with greater frequency than might be expected. It is surprising how ducts can dilate, and what expulsive power can be exercised by the gall bladder. There can be but little doubt that the gall bladder can completely empty itself of moderate-sized stones, and recover its normal condition.

When attacks recur but a stone is not impacted, the wall of the gall bladder becomes thickened and its cavity contracted.[1] Its infected contents are bile-stained inspissated fluid, pus, or thick stringy mucopurulent fluid, which sometimes glues the stones together. Inflammation spreads from the cavity through the walls to the surrounding peritoneum, and the gall bladder becomes enveloped in an indurated vascular mass of omentum. The fixation so produced may lead to a natural cure, with fibroid thickening and degeneration of the coats of the gall bladder and fixation of the stones, if the cystic duct is sufficiently patulous to allow of efficient drainage. I have many times, in the post-mortem room, found such a gall bladder sometimes dried up, and, in whole or in part, calcareous, grasping its calculous contents. If the cystic duct does not admit of effective drainage, an abscess forms in and around the gall bladder, and the prognosis is that of localised gall bladder suppuration. In the most acute cases the prognosis is that of septic peritonitis, resulting from perforation of a viscus. Such instances are rare, for the reason that previous

[1] Sections of such gall bladders, made for me by Dr. Bolam, show that the thickening is due chiefly to an increase of the muscular coat.

attacks have generally left adhesions which localise the escaping septic contents; though more than once, when operating for acute peritonitis in an abdominal emergency, I have found the peritoneal cavity distended with bile-stained purulent fluid, a gangrenous ruptured gall bladder, and gall stones free in the abdomen. The only hope for such cases is immediate operation.

The prognosis is serious if there be marked tenderness of the gall bladder, loss of flesh and strength, or elevation of temperature or recurrent rigors, which suggest suppuration in the distended gall bladder. As a rule, such a gall bladder is surrounded and protected by the omentum, which possesses this function in so remarkable a degree, that I have for some years spoken of it to students as the "abdominal policeman." If there are no adhesions, the pus may rupture into the general peritoneal cavity. The more common termination is by a localised abscess round the gall bladder. This may follow several courses, some of them tending to recovery, others to death.

Rupture of the gall bladder, as I have elsewhere pointed out, is not a rare termination of suppuration of its contents, and I have satisfied myself that the contents can be absorbed, the stones encysted, and the patient get well. On several occasions, when operating, I have found stones lying outside of the gall bladder, safely wrapped up in omentum, with or without purulent surroundings, and a plug of omentum securely glueing up a hole in the gall bladder.

The abscess, as is well known, may leak into an adjoining viscus, duodenum, stomach, and colon, to the relief of all urgent symptoms; but possible intestinal obstruction from gall stones or future gall bladder trouble, after closure of the fistula, have to be remembered in giving the prognosis.

Occasionally the abscess may open externally through the abdominal wall; more rarely pus finds its way through the gall bladder into the liver substance, forming a hepatic abscess.

When the gall bladder is distended by a clear mucoid fluid, as suggested by a large, hard, freely movable tumour, without markedly active symptoms, the prognosis depends upon whether the block is fixed or temporary, and what further changes occur in the gall bladder contents. The most probable is pus infection, and the prognosis is then that of the previous variety. The tumour may, however, continue for years unchanged, or it may steadily increase till it forms a large swelling, or it may gradually shrink and finally disappear. If a small stone is impacted in the cystic duct, the gall bladder is distended on some days and not palpable on others, when the absence of spasm allows escape of the gall bladder contents. If the stone is not firmly impacted, it may fall back into the gall bladder, when its contractions cease. This condition frequently occurs when a single good-sized stone is present. I have had the opportunity

of observing instances of each of these terminations, and in one case, when I aspirated the gall bladder on two separate occasions, ten years after the last aspiration, I was able to feel a very hard symptomless and painless swelling, which I believed was the atrophied gall bladder contracted on a large stone.

It will thus be seen that, except in the most acute attacks, which are very rare, recovery unaided by operation is possible in these cases. Indeed, some medical men of large knowledge and experience have told me that patients rarely died from gall stones, and that operations of which they had knowledge were not so successful as they had been led, by perusual of the most recent literature, to expect. Considering the serious nature of the attacks, the grave illness which often follows, and the frequency with which recovery occurs, more often, I believe, than in any illness of like severity, a too optimistic belief in the probability of recovery, based upon the remembrance of two or three well-remembered and apparently hopeless cases which got well without operation, has been formed. Surgical experience has abundantly proved that gall stones are occasionally a grave danger to life, and frequently a cause of chronic and serious ill-health. I can recall a considerable number of deaths from gall stones for which no operation had been performed, and post-mortem examinations occasionally reveal the fact that gall stones are a dangerous possession. The illness resulting from them is directly or indirectly the cause of premature death much more frequently than is suspected.

If a stone is driven into the common duct and arrested at any part of its course, the same spasmodic pains are present as in the previously described condition. Shivering and vomiting are likely to be more pronounced symptoms. The escape of bile is prevented, and the gall bladder becomes tense. If previous attacks have not left it small, contracted, and bound down by adhesions, it may be felt in the usual position as a tense, tender, rounded swelling: but this is comparatively rare. As a rule, the thickening and contraction left by hypertrophy and inflammation resulting from previous attacks prevents the gall bladder from distending sufficiently to form a tumour, hence the aphorism that "jaundice with a gall bladder tumour is not the result of gall stones." Like the majority of aphorisms, there are exceptions to this one. A gall bladder which has once been much dilated probably never recovers its previous size. Jaundice follows the attack in a few hours, and may pass off in the course of a day or two or never totally disappear. In cases where it does not totally disappear there is a recurrence of the attacks, and with each recurrence an increase of the jaundice.

Diagnosis.—In typical instances the diagnosis of gall stone in the common duct is easy. It is unlikely that an illness commencing with a sudden violent pain in the upper abdomen, followed

by recurrences of the pain and intermittent jaundice without a palpable distension tumour of the gall bladder, is due to any other cause. The diagnosis may be made certain by the discovery of gall stones in the fæces, and these should always be carefully sought for several days after the attack. The behaviour of the duct in the presence of a stone must be considered before going further, as on this depend many of our conclusions.

A small stone, one not larger than a pea, will cause temporary occlusion of the common duct and jaundice: a large stone, one the size of a walnut, will not cause its permanent occlusion; the jaundice is intermittent. Here it must be noted that in some rare cases the symptoms and signs of gallstone closely simulate those of malarial fever. Repeated shivering attacks *without pain*, attended by fever and followed by jaundice, may be the only evidence of gall stones in the common duct. In these instances I have always found the gall bladder contracted and functionless and the common duct largely dilated. The painful attack during which the stone was driven into the duct may have occurred so long ago as to have been forgotten. How are such facts to be explained?

The conduct of the urethra, ureter, and intestine, similar muscular tubes whose action may be more readily observed, offers a solution of the difficulty. A small stone in the ureter will cause a temporary obstruction, followed by dilatation above the site of the obstacle, and by hydronephrosis of the corresponding kidney. These attacks will recur from time to time so long as the stone remains. A bougie introduced into the urethra will at times be grasped so tightly that its onward progress or attempted removal is strongly opposed. The same bougie, tied in, will cause dilatation and allow of the easy passage of a large instrument. When a large gall stone escapes into the intestine, symptoms of acute intestinal obstruction may follow: but, after a time, passage of flatus and fæces occur, with relief to the symptoms; and it rarely happens that a patient dies until worn out by repeated attacks due to the single stone. In each instance the presence of a foreign body causes spasm of the muscular tube, the intruder is firmly gripped, the lumen is completely occluded, acute obstruction supervenes, and its characteristic signs and symptoms follow. When a gall stone is driven into the common duct, it causes spasm of the duct and complete occlusion of it, followed by obstruction to the escape of bile into the duodenum, and jaundice. After a time, the spasm relaxes, bile again passes, the jaundice and other symptoms tend to disappear; and even though the stone remains, there may be no evidence of its presence. The capacity of this small tube for expansion appears to be almost infinite, for I have on several occasions seen it so much distended as to be mistaken for the duodenum. In these circumstances the duct may become paretic, hence the absence of pain previously noted. In this con-

dition, an ordinary stone lies loose in it, and such stones have been described as "floating." Two explanations may be offered for the recurrent attacks and jaundice in these cases, where only a single stone exists in the common duct. The first, and this, I believe, from observation on operation cases, to be the usual one, is, that spasm of the duct is readily produced by stimuli, *e.g.*, a hearty or indigestible meal, exercise, etc.; the second, that a "floating" stone may be suddenly displaced and may temporarily block the duodenal orifice of the duct.

PROGNOSIS.—In many instances, as has been previously stated, a stone or stones will make a successful passage through the ducts into the duodenum and escape with the fæces. In this manner, cure may be effected by natural resources. In at least one instance I had definite proof of this possibility. For more than a year a stout middle-aged woman had been incapacitated by frequently recurring attacks of gallstone colic, and after the majority of attacks a stone was recovered from the fæces. Of these calculi she showed me a considerable collection. The last attack a week before had been more prolonged and more severe than any of the others, and she determined to have an operation. I found the gall bladder thick-walled and contracted, with some adhesions round it, but empty. All the palpable ducts were thickened and enlarged, but empty; and it was evident that all the stones had been passed. This view has been confirmed by the fact that she had no attack since the operation, several years ago.

But unfortunately the stones do not usually escape. The opening of the common duct into the duodenum is its narrowest and most rigid portion, and a stone which may readily enough pass down the rest of the duct is unlikely to be able to pass this. The arrest of the stone is followed by dilatation of the duct, the gall bladder may empty itself into the duct, and the stone is carried back by the forcible bile stream into a higher portion of the duct. There it may lie for long periods and offer no sign of its presence, as the duct is dilated round it sufficiently to allow of the free escape of bile. In one of my acute cases, after operation and removal of several stones from the common duct, and of a large number from the gall bladder (which was completely emptied), the patient was "cured" for more than a year. She then had a return of such urgent symptoms that a second operation was necessary. This disclosed a single hard stone in the common duct, the size of a large filbert, *with facets upon it*. Since these facets must have been produced by the pressure of other stones, it had obviously been in the ducts all this time without producing any symptoms, as the recovery appeared to be perfect. Since its removal several years ago, the patient has remained well.

The common course of events is, that the irritation of a stone in the duct is the precursor of inflammation, and the swelling and obstruction of the ducts caused by this, hinders the escape of bile

sufficiently to prevent the entire disappearance of jaundice. The usual history in these cases is of recurrent attacks of pain, due to spasm of the ducts caused by the irritation of the stone in the inflamed duct, or else due to the escape of fresh stones from the gall bladder into the ducts. The painful attacks are next followed by an increase of the jaundice, and are accompanied by vomiting, shivering, and rise of temperature. These attacks are so typical that they are universally recognised as characteristic of the presence of gallstone in the common duct, and they occur in the overwhelming majority of cases. It is possible to go further, and in these cases of sudden severe pain, followed by persistent jaundice with intermittent pains and increase of jaundice, rigors, and rise in temperature, to make a diagnosis of gall stones and infection of the bile ducts.

It is the latter which requires most serious attention when the prognosis comes to be considered. The inflammation of the ducts, like other septic infections, is always uncertain in its course and terminations, and from a mild commencement may develop a furious end. It seems probable that if the infected bile has a free outlet into the duodenum, no serious symptoms are likely to occur; but if the pent-up bile is retained in the ducts, the general symptoms of septic infection become pronounced, and the local changes consequent on inflammation occur in the ducts and surrounding liver. These are, it is scarcely needful to say again—(1) resolution, (2) fibroid thickening (in liver cirrhosis), (3) partial destruction (in ducts—ulceration, in liver—abscess), (4) total destruction—gangrene in ducts.

Serious though these conditions are, it is possible to have spontaneous recovery from them all. This is generally brought about by the formation of a fistulous communication between the duodenum and the common duct or gall bladder. The stone causes ulceration, a localised abscess (prevented from becoming diffuse by previous adhesions) opens into the intestine and allows of the escape of the stone; a fistulous communication permitting of free bile drainage is established; and, notwithstanding the fact that many stones may be left, a "symptomatic cure" is brought about. More rarely, a suppurating gall bladder adheres to the abdominal wall and ruptures there, leaving a biliary fistula, but removing all serious symptoms. Still more rarely, stones escape by ulceration through the duct, leaving this channel free, into a cavity limited by adhesions; and become encysted there, with subsequent closure of the opening in the duct, and it may be with or without the formation of pus. If the pus escapes into the intestine, healing of the abscess may occur, leaving the stones buried in adhesions.

But the dangers in such cases are, that the patient is worn out by the recurring attacks of pain, by septic absorption from the inflamed ducts, gall bladder, and liver, and by the toxæmia

resulting from bile absorption. Sudden death, apparently from heart failure, is no uncommon event in such cases, and may occur during what is considered to be convalescence. In such circumstances one of my patients died suddenly whilst on the commode; a second in the act of getting out of bed; a third complained whilst convalescent of a sudden severe return of pain, and died in a few moments; on post-mortem examination, I found a small stone impacted in the duodenal orifice of the common duct. Operations on such patients prove that their illness has increased their susceptibility to all the three great dangers of operations, namely, sepsis, hæmorrhage, and shock.

A second, though rare cause of sudden death, was illustrated in the case of a stout woman whom I had seen many times with recurring gallstone attacks and jaundice. She appeared to be improving at the time of her sudden death. Post-mortem examination showed that death was due to a large intraperitoneal hæmorrhage which had come from the portal vein. A stone lying in the common duct projected through an ulcerated opening into the vein, where it lies in close proximity to the duct in the right border of the gastro-hepatic omentum.

Treatment.—Here the first consideration has to be given to surgical methods, and it is only when for some sufficient reason the removal of the stones cannot be advised that any other measures should be suggested. If a stone be discovered in the urinary bladder, no medical man would suggest that it should be left there till cystitis and kidney infection made the patient seriously ill, and its removal imperative; but this is a too frequent practice in the case of gall stones. Without doubting the diagnosis, some physicians will, after the failure of ordinary measures, recommend a patient suffering from gall stones to try a visit to Carlsbad! It is difficult for surgeons who know with how little risk stones can be removed from the gall bladder, to speak of such advice with proper professional courtesy. The risk of gallstone operations is the result of delay. Stones may be removed from the gall bladder with as little risk as is incurred in any ordinary surgical operation; and no hesitation should be felt in advising that operation be undertaken, before they have made their escape from that viscus, and with the object of preventing its occurrence. The record of the post-mortem examination of my cases shows more plainly than anything I can urge, the increased risks of operation postponed till stones have escaped into the common duct.

Case 1.—*Acute sepsis; advanced liver cirrhosis.*—All ducts throughout much dilated.

Case 2.—Operation recommended five years before; œdema of all parts in the neighbourhood of liver noticed at operation. Liver ducts much dilated throughout: common duct size of duodenum; active

septic infection with abscess in liver pouch and over liver caused death on ninth day after operation.

Case 3.—Death forty-eight hours after operation from acute sepsis? Wound showed some signs of infection. Peritonitis limited to liver pouch. Whole of liver ducts dilated and containing purulent bile-stained fluid. From the lesser ones almost pure pus escaped.

Case 4.—Operation advised three years before. Chronic jaundice; common duct size of duodenum. Many stones removed from common and hepatic ducts and one from gall bladder. Death forty-eight hours later. Acute sepsis?

Post-mortem.—Wound looked healthy; no peritonitis; all bile ducts much dilated; innumerable gall stones had been left. In the very smallest intrahepatic ducts, gall stones varying in size from a pea to coarse sand were found.

Though it must be admitted that the results recorded here are exceptionally bad, they may serve the good purpose of emphasising what has been my universal experience,—that operations on the gall bladder may be undertaken with confident assurance of success, but that the operation for the removal of stones from the bile ducts is a dangerous and often impossible one. Sepsis, the greatest danger of operations, is already present, and operation may be the means of increasing it; hæmorrhage, the next risk of operation, is more difficult to arrest and more likely to occur in jaundiced patients; and shock is readily produced and difficult to combat in patients who have suffered from recurrent gall-stone attacks. Hence the high mortality. If any doubt as to the propriety of operation in gallstone cases is to be entertained, let it be kept for those worn-out jaundiced patients in whose common ducts stones have been retained for months or years, to whom operation has been only suggested as "a last resource," and in whom, even if immediately successful, the operation may fail to cure because all stones are irremoveable.

The Operation.—The abdomen may be opened by a variety of incisions, and that advocated by so great an authority as Mayo Robson, and mostly in favour with surgeons, is a vertical one through the right rectus muscle. The next favourite is an oblique incision parallel to and a finger's breadth below the right costal margin.

My own is a transverse incision in a line from the right border of the rectus muscle to the outer margin of the flank, and opens up the space between the liver above and the transverse colon below. I described this space in the *Brit. Med. Journ.*, London, November 3, 1894, and there advanced what I considered, and still think, were good reasons why this operation was better than others. Special care must, especially in jaundiced cases, be taken to secure every bleeding point. It is certain, whatever may be the value of other measures to arrest hæmorrhage, that the ligature is still the best and the safest. In dividing the deeper

structures, it is wise to pick them up in the forceps, draw them forward, and divide the tissues between; for in this way the liver will escape incision, to which it is liable, from its resemblance to the muscular substance covering it.

When the gall bladder is distended, it often comes into view at once, and always does so on drawing the liver up and pushing the transverse colon down. A large flat sponge is next pushed into the hepatic pouch, to keep the colon down and to catch any escaping gall bladder contents. The gall bladder may be so large and so movable that its fundus is readily tilted out through the opening, and the operation is then very simple. After opening the gall bladder, the fluid contents escape. In many cases it will be observed that the first discharge is the clear mucoid secretion of the gall bladder, while towards the last the discharge becomes purulent, and finally consists of pus. The pus has sunk down to the neck of the gall bladder, just as the pus in purulent urine standing in a conical glass will sink to the bottom. When the gall bladder has been emptied, the stones are to be removed. This is most readily done by introducing the fingers of one hand underneath the gall bladder, and by pressure outwards between the fingers below and the liver above forcing the stones up to and through the gall bladder opening. When any difficulty is met with, a finger should be introduced into the gall bladder, and with this as a guide to the position of the stone, a scoop or forceps may help its escape. It must be remembered that the loose stones are not the cause of the trouble; and careful search is to be made for one that is impacted, either in the neck of the gall bladder or in the cystic duct. It is true that a collection of stones glued together by sticky gall bladder contents may have caused the obstruction, but this is rare. As a rule, a single large stone has become impacted in the neck of the gall bladder. Probes or finger inside of the gall bladder may miss this. It is important to feel the neck of the gall bladder, and indeed all the ducts, between the finger and thumb, introduced into the hepatic pouch and the foramen of Winslow. Between the finger and thumb so introduced, a stone in the neck of the gall bladder or the cystic duct can generally be squeezed back into the gall bladder and removed.

Having satisfactorily emptied the gall bladder, the next consideration is, How is it to be treated? And as this question receives a different answer from nearly all authorities, I will state my own practice, and the reasons for it.

Let it be assumed that the wall of the gall bladder is healthy, that the contents, although purulent, mean no grave infection, and that all stones have been removed.

The question now to be answered concerns the patency of the cystic duct. Probes are unsatisfactory instruments for the determination of this, for the cystic duct is a difficult channel to

navigate. If bile flows into the gall bladder when the stone is removed, the patency of the duct is assured; if not, I pump the gall bladder with warm saline fluid, and am guided by its escape through the ducts or otherwise as to the patency or obstruction of the cystic duct.

With a patent cystic duct, I entirely close the gall bladder and return it to the abdomen. At the same time it is my practice to drain the hepatic pouch at its most dependent part by a tube for a few days, lest leakage should occur. I feel safer in leaving a tube in the hepatic pouch for a few days, because in one of my cases some bile did escape from the gall bladder six days after operation, and the presence of a tube prolongs healing for a few days only.

In these cases I expect the cholecystitis to cease after the removal of the stones, for the same reason that a urinary bladder cystitis is likely to disappear after the removal of a stone; and it seems to me to be as unreasonable to demand artificial drainage of the bladder in the one as in the other.

That operation for the complete closure of the gall bladder is safe, I know. I have no evidence that its ultimate results are other than satisfactory, though I have done it very many times and for several years, and patients so treated are able to leave hospital at the end of a week.

If the cystic duct is obstructed, the illness is recent, and the cause therefore likely to be temporary swelling. I drain the gall bladder by tying in a drainage tube and bringing it out through the loin, never by suturing the gall bladder to the parietes. Since adopting this practice more than ten years ago, I have never had trouble with a biliary fistula. I drain the gall bladder in the same way if there are signs, such as thickening, reddening, or presence of surrounding adhesions, that its walls are deeply infected.

If the gall bladder is acutely infected, with a patch or patches of gangrene which first appear at the fundus, it is usually found embedded in and adherent to a thick œdematous mass of omentum, from which it can be readily separated. It is tempting to think of removing the septic focus by excision of the gall bladder, a plan which has received the advocacy of Moynihan, but further experience is needed before I can accept his view. It is impossible in the most acute of these cases to remove the whole of the septic infection; for it has already passed beyond the confines of the gall bladder. Experience has taught me that extensive operations are badly borne by acutely septic patients, and the raw surface left by an extensive operation may allow of fresh absorption and increase of the septicæmia. I am content, as yet, to open, empty, and drain the gall bladder with a tube, and to protect and drain the hepatic pouch with a thick gauze strand. Let me also here point out that many of the arguments that are

used in favour of cholecystectomy as a routine practice do not appeal to me. Though more than ten years ago I advocated removal of the gall bladder to prevent the re-formation of stones and to diminish the risk of biliary fistula, I have since become more conservative, for the following reasons: because a patient whose gall bladder I had excised seven years previously had a recurrence of gall stones in his common duct; because, after ceasing to attach the gall bladder to the parietes, I have never seen a biliary or other fistula remain; because I do not believe that the gall bladder will fail to recover its functions when emptied of stones; and because of its possible future uses.

I excise the gall bladder under the following circumstances: when it is the seat of malignant disease; if the cystic duct is occluded, and the occlusion is probably permanent; when a thickened diseased gall bladder has been separated from the intestine in a case of biliary fistula, in order to give the intestinal opening a better chance of closing; and when a stone in the cystic duct causes more than usual trouble to extract, the object being to remove the cystic duct and the stone together.

Choledochotomy.—The removal of a stone from the common duct may be easy, or may be attended by serious difficulties. In a thin, lax patient, whose hepatic pouch is free from dense adhesions, and with a stone in the common duct above the pancreas, the operation can be readily accomplished. With the forefinger in the foramen of Winslow behind the duct, and the thumb on the outside of the duct, a stone can be palpated, made prominent in a suitable position through the wall of the duct, cut down upon safely with the prominent stone as a guide, and squeezed through the incision in the duct. I make the incision in the outer wall of the duct and towards its posterior part, so that the escaping bile falls directly into the lowest part of the hepatic pouch, and before squeezing the stone out grasp either side of the incision in catch forceps as a guide later to the hole in the duct. When the stone has been removed, the common duct should be carefully examined, if possible, by a finger,—and it generally is so dilated that this can be done,—and always with a long, thick probe. This should be passed first into the hepatic ducts and then into the duodenum, to ensure as far as possible that all stones have been taken away. Finally, the gall bladder should be opened and emptied. In these cases I drain the gall bladder by a tube sewn in, drain the common duct by a large tube sutured with catgut to the edges of the wound in the common duct, and the hepatic pouch by a large protective strand of gauze, all brought out at the most dependent part of the incision posteriorly.

The difficulties of the operation may be described as due to physiological and to pathological causes.

In the case of a short, stout patient, with active muscles,

and a liver firmly tucked up under the ribs, who is difficult to anæsthetise satisfactorily, the operation is very much more difficult than in the class of patient previously mentioned.

The most serious difficulties are the result of pathological changes, which have occurred in the hepatic pouch. There all the structures may be found densely matted together by such strong adhesions, that injuries to the intestine below and to the liver above may be with every care unavoidable. Each injury must be noticed and repaired. The first landmark I wish to find in these difficult cases is the gall bladder. Once it has been isolated by drawing it downwards and forwards, the liver is fixed and pulled towards the surface, and the tense cystic duct guides the fingers to the common bile duct, and a stone or stones in it. These are all, if possible, removed from the ducts, the gall bladder is emptied, and drainage completes the operation.

It will be noted that I have said, *if possible*, all stones are removed; and this is an important qualification. From published records of gallstone operations, it might be assumed that it was always possible to remove the stones, but this assumption would be very far from the truth. In cases of long duration, where there are multiple stones in the common duct, the whole of the hepatic ducts are dilated and frequently contain stones. When they do, it has been my experience that all the stones are seldom removed, for the very good reason that it is impossible to reach them. I have abundant post-mortem evidence of the truth of this statement, for I have seen, on many occasions, stones in every part of the liver, both in the ducts and lying outside of them in abscess cavities. A perusal of the notes of my fatal cases will show that many of them were truly inoperable, and the fact should be recognised that delayed operations may do more harm than good. The difficulty is to recognise these unsuitable cases before exploring them; but when once the operation has been undertaken, it is needful to do all that can be done for their relief. If stones are discovered in the hepatic ducts, all that are easily accessible should of course be removed, but no prolonged or serious manipulations should be indulged in. Drainage of the gall bladder and ducts must be relied on to do the rest. In the most serious cases I incline to the view that to establish a fistula between the gall bladder and the intestine (cholecystenterostomy) is the proper treatment. Nature cures occasionally in this way, and the hint is worthy of further consideration.

I operated in the case of a man deeply jaundiced and with symptoms of gallstone, and felt a stone impacted in his common duct. There were also nodules of malignant disease on the convexity of his liver. A prolonged operation was useless; and, without touching the ducts or stone, I performed chole-

cystenterostomy with a Murphy's button. The result exceeded my expectations, as for more than a year after the operation he was quite well; indeed, his recovery seemed to be so complete, till his symptoms recurred, that a distinguished surgeon was induced to remove the gall stone in the hope of curing him. It might have been better for some of the patients whose cases I am recording, if I had limited their operative treatment to cholecystenterostomy.

NOTES ON TROPICAL DISEASES.

By Major D. G. MARSHALL, I.M.S., *Lecturer on Tropical Diseases in the School of Medicine of the Royal Colleges, Edinburgh.*

THE TREATMENT OF GUINEA-WORM.—As one of the speakers who took part in the discussion on guinea-worm at the recent meeting of the British Medical Association truly remarked—"the great amount of physical infirmity caused by this affection is not fully understood, and it would be well were the disease more carefully studied."

Little advance has been made in the treatment of guinea-worm, most writers on the subject confining themselves to a description of the measures to be adopted when the worm is extruding. These measures vary from the ancient method of twisting out the worm on a piece of stick, to injection of corrosive sublimate, alcohol, etc.

There is, however, another and better form of procedure, namely, early detection and removal of the worm or worms while still free in the subcutaneous tissues, and before an attachment to the skin has been formed.

This method, as described below, should be followed not only when the presence of guinea-worm is suspected, but also when one is extruding. Multiple infection is very common, and in those cases where one worm is showing, careful examination will often reveal the presence of other worms in different parts of the body.

Detection.—The patient should be stripped, and the whole surface of the body examined. Occasionally the presence of a worm under the skin may be detected by inspection, but it is a good rule not to trust to inspection alone but to examine further by palpation—the whole skin surface being gently stroked with the fingers,—the presence of a worm, often in unexpected parts, as the arm, neck, or abdominal wall, imparting the feeling as though a piece of soft string was lying under the skin.

Removal.—This is a simple proceeding, no anæsthetic being usually required. The skin over the worm having been rapidly washed with a strong antiseptic, is stretched between two fingers of the left hand and divided by a small incision (about half an

inch in length) in the long axis of the worm. The body of the worm is usually seen at the bottom of the incision, and, being grasped with a pair of dissecting forceps, is quickly withdrawn. There is generally only trifling resistance, and a worm two to three feet long can be removed in a few seconds.

I have employed this form of treatment with much success in India, sometimes removing two or three worms from the same patient at a sitting, and can recommend it to those practising in countries where guinea-worm infection is prevalent.

THE PREVENTION OF ANKYLOSTOMIASIS IN MINES.—Since Dubini first described the parasite in 1838, ankylostomiasis has been well known as a disease of tropical climates, but it was not till the St. Gothard tunnel works started that its presence in Europe was recognised. From that time it has spread to the mines of all the coalfields of the Continent, and has caused not only great suffering, but great financial loss to the miners in France, Belgium, Hungary, and Germany. During the last few years it has appeared in Cornish mines, and isolated cases have been reported from Lanarkshire.

The system of ventilation and the general conditions are better in British mines than those on the Continent, but in view of the possible invasion of our mines by the disease, it is well that the most useful measures of prophylaxis should be ascertained.

In a valuable contribution,[1] Haldane entered fully into the subject—one point especially being brought out—that though cases were reported from other Cornish mines, none occurred in the Levant mine, though all the conditions, as heat and moisture, necessary for the development of the ankylostoma were present, the non-development being ascribed to the fact that the mine passes under the sea and the moisture in the mine is due to the presence of sea water.

Perroncito, Blanchard, Hugo, Boycott, and others have noted like conditions. Manouvriez[2] discussed the opinions of other observers, and in the same publication[3] is published a communication presented by Calmette on the 25th July 1905, in which he details the result of a series of experiments he undertook to ascertain whether salt water would really *per se* prevent the development of the worm.

The water used was obtained from four mines, in which, though neighbouring mines were affected, ankylostomiasis was unknown. The percentage of sodium chloride varied from 1·16 to 3·97.

Calmette found that the waters containing the smaller percentages had not the least effect on the development of the ankylostoma, while those with the larger percentages simply de-

[1] *Journ. Hyg.*, 1904, vol. i. No. 1.
[2] *Bull. Acad. de med.*, Paris, May 30, 1905.
[3] Tome liv. No. 30.

layed the hatching of the ova. He is forced to the conclusion, as a result of these experiments, that the idea of rendering the water in mines capable of preventing the development of ankylostoma by artificial means, as spraying with salt solutions, is impracticable, and that the most efficient and economical method of preventing a mine becoming infected is to institute careful inspection for the detection of the disease in the miners, and to thoroughly treat all cases, at the same time to prevent the men polluting the mine by alvine evacuations. To this end they should, if possible, be encouraged to use latrines above ground, or to use specially constructed latrines in the workings.

Discovery of a Hæmogregarine in Mammals.—Balfour,[1] of the Gordon College, Khartoum, announces this discovery. While working at trypanosomiasis, he found in the blood of a jerboa, or desert rat, that a large number of the red corpuscles contained an unpigmented non-motile parasite. He examined twenty-eight other jerboas, and found the same parasite in all except two. He submitted specimens to Laveran, who declared the parasite to be a hæmogregarine, and named it *H. Balfouri*.

The parasite in the blood corpuscles somewhat resembles the halteridium of birds, but is sausage- not sickle-shaped, is not pigmented, and does not show spore formation at either end as halteridium does. In addition to the intra-corpuscular form, Balfour describes a free motile vermicular form and a schizont stage in the form of cytocysts. Since finding the parasite in the blood of the jerboa, Balfour has also found it in the mononuclear leucocyte of the Norway rat, and Laveran has found it in the blood of jerboas in Tunis.

The discovery is of great interest, as hæmogregarines have never before been found in the red blood corpuscles of a mammal, and were supposed to affect only fish, amphibians, and reptiles.

The original article will well repay perusal.

Malta Fever.—From the third report of the Mediterranean Fever Commission just published, it would appear as though the mode of propagation of Malta fever, which has been for so long a puzzle, has at length been discovered.

The Commissioners had performed a vast amount of work with but little result, until, on June 14, 1905, Dr. Zammit, a member of the Commission, by chance examined the blood of some goats (the chief milk supply in Malta is derived from these animals), and was surprised to find it gave a positive and very marked reaction with the *Micrococcus melitensis*. Further investigation showed that the milk of a large proportion of the goats in herds supplying milk to the hospitals and other places, contained the micrococcus, often in enormous numbers.

Further work by the Commission apparently proves that Malta fever is a disease affecting goats, and is spread by the milk

[1] *Journ. Tropical Medicine*, August 15.

supplied by them. No doubt prophylactic measures based on this knowledge will be at once undertaken, and the results will be awaited with interest. In the meantime, Dr. Zammit is to be congratulated on the happy chain of circumstances by which he has been enabled to direct the investigations of the Commission into the proper channel.

LEPROSY.—About a year ago, Rost of Rangoon announced that he had been able to cultivate the leprosy bacillus, and had from it prepared a serum which he named Leprolin, by the use of which most favourable results had been obtained in the treatment of the disease.

To afford him an opportunity of thoroughly working out the subject, Rost was sent to pursue his researches in the laboratory of the Pasteur Institute at Kasauli.

As a result of several months' work, he finds there must have been some error in his original methods, as at Kasauli he was unable to cultivate the bacillus, and therefore, of course, unable to prepare Leprolin. Thus another "cure" for leprosy, from which much had been expected, has been shelved.

Prolonged incubation period in leprosy.—Patgas[1] describes a case in which the incubation period lasted twenty-one years, and very aptly points out that this, and other cases occurring at home after long periods of incubation, render it incumbent on all practitioners to be able to recognise leprosy when they meet it.

[1] *Arch. de méd. et de pharmacol.*, Gang and Paris.

REVIEWS OF BRITISH AND FOREIGN LITERATURE.

The Diseases of Children. By J. F. Goodhart, M.D. Eighth Edition. Edited by G. F. Still, M.D. London: J. & A. Churchill.

It would be neither uninteresting nor wholly unprofitable to glance over old catalogues and see how many medical works issued in the mid-eighties still survive. Their numbers would be few, we suspect; yet here is one, in its eighth edition, just about to attain its majority—a respectable age, which almost disarms the reviewer. "Goodhart and Still"—late "Goodhart"—is now so widely appreciated a manual of the diseases of children, as to be independent of critics; and that it has achieved this position will not be wondered at by readers of the new edition. A reviewer is often tempted to slur over accounts of common things, and take as his touchstone the descriptions of new and rarer maladies, and no greater tribute can be paid to the author's experience and clinical acumen than to say that in this book it is the pages on everyday diseases which interest us most, so free are they from the trite phrase, and so fresh the clinical picture,—nothing in the book testifies more strongly to its being a record of personal experience than this. Another feature of great value, and one which, we doubt not, has done much to carry the manual through so many editions, is the space devoted to therapeutics, on which suggestions are given with a quite unusual fulness of detail. A third general trend of the book is toward conservatism in surgical treatment, and it is against this, perhaps, that some criticism may most justly be levelled. In intussusception, especially, we doubt whether, in the face of the good results of early operation, attempts at reduction by inflation are justifiable. Personally, we would relegate this to the limbo where taxis for strangulated hernia now lies. In appendicitis, too, many physicians would incline more strongly to operation than the pages of this book suggest. On the other hand, we heartily agree that in not a few cases of empyema simple incision without resection is enough, and concur with Dr. Goodhart's view of the limitations of surgery in abdominal tuberculosis. Space forbids us to particularise at any length; we may, however, note as one of the best sections in the book that dealing with respiratory diseases, which abounds in practical hints, and bears the stamp of originality on every page. In the differential diagnosis of pneumonia, otitis media is not mentioned, yet it is one of the things to which one's thoughts fly in a doubtful case.

Dr. Still must be congratulated on his editorship. We agree that the book is fortunate in its foster-father. So homogeneously has he welded the whole, that it would tax a latter-day Astruc to detect the dual hand in the text, which shows throughout the lucid precision characteristic of all Dr. Goodhart's writing.

Lectures on Diseases of the Stomach and Intestines. By BOARDMAN REED, M.D. Bristol: John Wright & Co.

THE eighty-two lectures which compose this volume contain an ample account of gastro-intestinal disorders, and more than ample dissertation on their treatment. We say more than ample advisedly, for this is a book in which it is, as the saying goes, difficult to see the forest for the trees; it would have gained in value had terser statement, avoidance of repetition, and the omission of minor details allowed of its 1000 pages being diminished by a half. The book is divided into four parts, of which that on the anatomy and physiology of digestion calls for no comment. Methods of examination occupy a dozen lectures, in the opening one of which a page is devoted to interrogation on matters of sexual hygiene—a topic which it is surely necessary to broach only in rare instances. Dr. Reed prefers to all instruments his own percussion-*clapotement* method of estimating the size of the stomach; the motility is determined at the same time. In speaking of acetonuria, the writer ignores recent work on its significance in the dyspepsia of children, yet it is probably commoner in this than in any other gastro-intestinal derangement. The lecture on the blood is inadequate; the question of digestive leucocytosis in cancer and the glycogen reaction merit notice in a work of this kind. The section on treatment covers a wide field, almost all the newest remedies—mechanical, hydropathic, electrical, radiant, *et hoc genus omne*—being discussed. Considerable space is given to dietetics, but not more than the subject merits. The definition of a food is almost verbally that adopted by Hutchison, a clause being added with the obvious intention of excluding alcohol from the category. Yet, scientifically, alcohol is a food in the sense of being a fat-sparer and heat-producer; both it and benzene, when burned in stoves, *are* fuels, whatever Dr. Reed may assert to the contrary. A useful feature of this section is the diet tables of Leube and Penzoldt, which are valuable for reference. There is a good chapter on nutrient enemata, concluding with a paragraph on milk-baths, surely scarcely worth serious mention. A novelty in the lectures on drugs is the author's advocacy of very minute doses of active remedies—*e.g.*, $\frac{1}{1000}$ gr. of arsenite of copper, $\frac{1}{120}$ gr. podophyllin, etc. His defence against the charge of homœopathy in this practice is interesting, and we are far from disagreeing with him in principle, though throughout the lectures on therapeutics he inclines to optimism, and does not always distinguish *post* from *propter*. The gastro-intestinal clinic occupies the last 600 pages, and here practically all the diseases of the stomach and bowels which are within the range of diagnosis, and a few which are beyond it, are described. This is the best part of the book, and though many criticisms of details might be made, the author cannot but be said to have succeeded fairly well. The matter of the volume is good on the whole, but couched in a curiously wordy style, and the reader has constantly to sift wheat from chaff—a labour the writer ought to have spared him. No attempt is made to emphasise cardinal points, and in the result perspective is lost. One gets very tired of such platitudes as the advice to a dyspeptic to cultivate a cheerful spirit at meal hours. Our conclusion after reading Dr. Reed's book is that, taking it as a whole, he has unfortunately

failed to do justice to the wide knowledge of his subject which he undoubtedly possesses.

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1. *Morphology and Anthropology: A Handbook for Students.* By W. L. H. Duckworth, M.A.

2. *Studies from the Anthropological Laboratory, the Anatomy School, Cambridge.* By the same Author. London: C. F. Clay & Sons.

1. Morphology and Anthropology are two branches of science which have crystallised out of the investigations, pursued along different lines, to solve the interesting problem of man's place in nature. The wider term, anthropology, properly speaking, includes the whole natural history of man, and presents an enormous field of material in the various habits, customs, structure, clothing, and amusements of the different races of man. The term is, however, commonly restricted to one subdivision of the whole, namely, that portion which deals with the structure of the different races, living and extinct, and may be defined as being the comparative anatomy of mankind.

It includes within its sphere of investigation the structure of prehistoric man, as disclosed in the scanty remains which are found in tombs and caves of the earth; it examines critically the features which distinguish the higher races from the lower, and it even ventures to indicate the lines along which advance must be made if the human race is to continue to progress and evolve. Its interests are not purely academic, but are of the highest practical importance, since it studies the physical condition of the people, and provides data for the legislator and social reformer, and points the way to means for improving the physical condition of the race.

The relation of man to other members of the order Primates was the problem which, it may be said, gave origin to anthropology, and endless discussion has taken place, especially during the last fifty years, round this subject. The present position of the matter appears to be that man is not a direct descendant of the modern ape. These creatures are highly specialised along their own lines, and they and man have probably sprung from an ancestor very much further up the genealogical tree of the human race.

In the first of the volumes under review, Mr. Duckworth gives an excellent account of the scope of anthropology, and of the lines along which investigation should be pursued, and points out how data from comparative anatomy, from embryology, from the facts of variations, of geographical distribution, and of the character of fossil remains, must all be studied in order to determine man's place in the animal kingdom, and the nature of his ancestors. This introduction is followed by a most comprehensive and useful account of the principal facts from these sources which bear upon the questions. The anatomy of the higher apes is carefully described, and a good account is given of the anatomy of the fœtus, drawn largely from the work of Ballantyne and other workers on this subject. Among the most interesting of the chapters is that relating to fossil hominidæ, in which the author discusses fully the characters of those remains which from time to time have been proclaimed to the world as the "missing link"; and he boldly states

his belief that the "pithecanthropus erectus," of which Dr. Dubois discovered scanty remains in Java, is the nearest ancestor yet found of the human race, and does not share the view of most English anatomists, who believe that these remains are truly human.

The volume will be found of greatest use as a work of reference upon these matters, for Mr. Duckworth does not attempt to state or to discuss other problems of anthropology, or such as deal with the more immediate ancestry of the present races of mankind. But the information given appears to be of a most exact and complete character.

2. The second volume is a collection of papers, many of them descriptive of the anthropological material in the Cambridge University museum. Specimens of the crania of several extremely interesting races are described, and data given regarding them, which will be of use to other workers on the subject. Most of the illustrations in both books are from the author's own pencil, and are on the whole of unequal merit.

Mr. Duckworth must, however, be congratulated upon the general character of both works, which shows that he has spared no pains in the collection of a great amount of detailed information, and has provided a storehouse of facts which will be of use to workers in physical anthropology and morphology.

Manual of Midwifery. By A. L. Galabin, M.A., M.D. (Cantab.), F.R.C.P., Consulting Obstetric Physician to Guy's Hospital. Sixth Edition. London: J. & A. Churchill.

It is scarcely necessary to say much in reviewing a new edition of a work which has, since its first appearance, held a foremost place as a standard work of obstetric literature. The present edition is enlarged by over forty pages, and contains many new figures. Those latter deal specially with the subject of development, based upon Peters' description of an early ovum. The author still believes in the possibility of primary abdominal pregnancy, and he describes an illustrative case. Parts of the chapters on ectopic gestation, Cæsarean section, placenta prævia, and deciduoma malignum have been rewritten and brought up to date. There is very little to be found in the book which can be adversely criticised, and, taking the volume as a whole, the author is to be congratulated on producing a work which we strongly recommend as being a thoroughly reliable guide both to practitioner and student alike.

The Conjunctiva in Health and Disease. By N. Bishop Harman, F.R.C.S. London: Baillière, Tindall, & Cox. 1905.

This treatise, consisting of 276 pages, is a record of research work on the conjunctiva, and reflects very great credit on the author, for not only has it entailed a considerable amount of work, but it is a careful, painstaking, and valuable record of very interesting clinical details. That there are some faults cannot be denied, but, taking the work as a whole, we have no hesitation in saying that it is a valuable contribution to ophthalmic literature.

The experiments of inoculating the conjunctival surface with micro-organisms are instructive and corroborative. So also are the references to the bactericidal effect of the tears and the sterile nature of phlyctenules. We are left, however, *in statu quo* as to the exciting cause of conjunctivitis, feeling, like Hamlet, that there are more things in heaven and earth than are dreamt of in *our* philosophy. The chapter on simple conjunctivitis is well written, many interesting and suggestive points being brought out. At the top of page 68, the term used to denote the congenital condition denoting a double row of eyelashes, is spelled districhiasis, the meaning being entirely altered by the insertion of the letter "r,"—στίχος, a row, and not θριξ, a hair, being the derivation of the word. In the chapter devoted to the treatment of ordinary conjunctivitis, we observe that the author is sceptical as to the therapeutic value of protargol, believing that its value is chiefly due to the increased flow of tears, through the irritation produced by its instillation. Argyrol, the newer colloidal salt of silver, possesses marked therapeutic value in the treatment of these conjunctival inflammations, and yet it causes no increase of lachrymal secretion, being painless. Crede's prophylactic treatment of blenorrhœa neonatorum should not be condemned on account of the pain produced by the silver nitrate, a slight modification—using argyrol 25 per cent. instead of silver nitrate 2 per cent.—would not only entirely obviate the objection, but, we venture to say, would improve the efficacy of this form of prophylaxis.

The forty-seven pages devoted to trachoma are the most interesting in the book. The gonorrhœal origin of trachoma is revived by the author, but we find it difficult to trace any real connection between this disease and gonorrhœa. In deprecating the over-energetic treatment sometimes seen in dealing with trachoma, we heartily concur. We have seen very satisfactory results follow the free use of normal physiological salt solution, and nothing else, in an epidemic involving upwards of sixty persons.

The treatment of phlyctenular pannus by the electro-cautery, so highly prized by the author, is, in our opinion, not so simple as stated. Other remedies, less formidable and equally efficacious, might at least be mentioned.

Any one interested in ophthalmology will do well to read the book carefully, for there is a freshness and suggestiveness about it seldom seen either in text-books or in monographs.

Manual of Operative Surgery. By John Fairbairn Binnie, Professor of Surgery, Kansas City Medical College. Philadelphia: P. Blakiston's Son & Co. 1905.

Although of modest proportions, this book is full of good material, and supplies a more extensive résumé of modern operative procedures than is usual in English manuals. It makes a distinct advance on other works of the same compass, and to those who are unacquainted with recent continental and American writings, it confers a decided boon. While lavish in his quotations from recognised authorities, Dr. Binnie does not hesitate to express his own opinions, and the reader is given to understand that these are based on a considerable personal

experience. The author's aim to be practical, to describe operative procedures as they are done on the living subject, instead of on the cadaver, is successfully accomplished. The writing is eminently clear and easy to follow, while here and there it is both racy and forcible. The following may be quoted:—"Various antiseptics have been administered by the mouth, in the hope of lessening the filthiness of the rectum, but in the opinion of the writer such endeavours must be as futile as an attempt to antisepticise the Mississippi River at New Orleans by pouring a barrel of corrosive sublimate into its current at St. Paul."

The undergraduate must note that amputations, ligations of arteries, and operations on the bones and joints of the extremities, are entirely omitted. It is apparently presumed that these are well enough described in the existing text-books.

The chapters on abdominal operations are among the most successful, particularly those on appendicitis, intestinal obstruction, and hernia.

The illustrations, although poorly executed and for the most part borrowed from foreign sources, are well chosen, and add very materially to the usefulness of the book.

Trachoma. By Dr. J. Boldt. Translated by J. Herbert Parsons, D.Sc., F.R.C.S.; and Thomas Snowball, M.B., C.M. With an Introductory Chapter by E. Treacher Collins, F.R.C.S. London: Hodder & Stoughton.

This monograph embodies the results of many years' experience in one of the continental hot-beds of the disease, and contains the most complete list of statistics which has yet been collected. It provides at the same time a concise description of the whole subject.

In this country trachoma is an alien disease, and has recently been brought to the notice of the British public by the Reports of the Royal Commission on Alien Immigration and by the introduction into the House of Commons of the Alien Immigration Bill.

The translator has been fortunate in being able to supplement Dr. Boldt's account by the statistical researches of Mr. Treacher Collins, which have been set forth in an introductory chapter, and which cannot fail to be of the greatest interest to English readers, dealing as it does with trachoma at home and in our dependencies. This chapter, consisting of fifty-two pages, is admirably written, and reflects great credit on British ophthalmology, reference to which, by the way, is conspicuous by its absence throughout the monograph proper.

The book is divided into eight chapters, with a useful bibliography. Chapters i. and ii. deal with the history, epidemiology, and geographical distribution of trachoma. The remaining chapters are of a more practical nature, and treat of the symptoms, course, etiology, diagnosis, prognosis, treatment, and prophylaxis of the disease. The whole work is a perfect mine of information, and must be of incalculable value, not only to the ophthalmic surgeon, but to medical officers of health, and to medical officers in charge of large institutions where outbreaks of the disease may be met with.

English-speaking readers must be grateful to the translators for

placing this valuable work before them in such an accessible form, and we heartily congratulate the translators on the success which has attended their efforts.

Tyson's Practice of Medicine. Third Edition. London: Rebman Ltd.

We congratulate Dr. Tyson on the well-deserved success which has attended his book. This is an essentially practical treatise, evidently the fruit of long and varied clinical experience, and a thorough knowledge of the literature. With theories Dr. Tyson deals briefly, but on diagnosis and treatment he writes at great length, and yet contrives to keep the book agreeably free from "padding." As such, it is admirably suited to meet the needs of the senior student and the practitioner of medicine.

Infectious diseases are very fully considered, and the classification thoroughly up to date, but the author hardly gives sufficient credit to the recent additions to our knowledge of the bacteriology of rheumatic fever. We especially commend the manner in which, when describing special modes of treatment, such as the bath treatment of typhoid fever, the antitoxin treatment of diphtheria, and the hypodermic administration of quinine in malaria, minute details are given of the measures to be adopted; and this holds good of the paragraphs on treatment throughout the entire work.

The chapter on diagnostic technique in diseases of the stomach and intestine deserves special praise. Under the etiology of gastric and duodenal ulcers, we find reference to the presence of micrococci, but no note is taken of the cases of perforating ulcer of the jejunum which have followed gastro-jejunostomy, while in these days of abdominal surgery it cannot be said that carcinoma of the stomach is invariably fatal. It is unfortunate that the term "hæmatogenous jaundice" is retained.

The section on diseases of the heart and blood vessels is almost uniformly excellent. We cannot, however, endorse Dr. Tyson's advice to introduce a stomach tube in order to demonstrate the pulsation in an aortic aneurysm. On page 628, "the apex of the aortic arch" is said to be *behind* the trachea.

Concerning the diseases of the blood and of the thyroid gland, the only criticisms we need make are that the last line of page 656 and the first line of page 657 are mutually contradictory, and that when describing exophthalmic goitre mention ought to have been made of "masked" cases, whereas the author states that the diagnosis of this disease requires no description.

In the section on constitutional diseases, the author gives a masterly account of the treatment of diabetes mellitus.

Passing over the section on diseases of the urinary system, which Dr. Tyson has made his own special study, we find diseases of the nervous system described very fully. Here the author has had the collaboration of Dr. W. G. Spiller, and this section will be found for the most part thoroughly sound and up to date. We find no reference to muscular hypotonia and loss of sexual power in tabes dorsalis. On page 991 we are told that primary optic atrophy occurs in 40 per cent.

of cases of multiple sclerosis and 15 per cent. of tabes, while on page 1070 it is stated that optic atrophy is sometimes present in multiple sclerosis, less commonly than in tabes. For some reason Babinski's sign has been omitted in the differential diagnosis of functional and organic paraplegia, and a knowledge of the recent work of Babinski and others would have spared us the statement that "in cerebellar disease the upper extremities are almost never implicated." The distribution of the cutaneous nerve supply to the fingers does not concur with British anatomical teaching.

A good account is given of animal parasites. On page 1191 we take it that the advice to give rectal injections of corrosive sublimate 1 to 500 for threadworms, is a printer's error for 1 to 5000. The last section of the book, that on poisons, might be omitted with advantage.

The printing and binding of the volume are in accordance with what we expect in the best class of American text-books, but a more careful reading of the proof-sheets would have avoided several discrepancies, and also numerous printer's errors. Fortunately these mistakes are for the most part self-evident, but they detract from the general excellence of the work.

In the work as a whole there is very much to commend, and as a text-book of practical therapeutics alone it is well worth a place in every medical man's library.

Epilepsy and its Treatment. By W. P. Spratling, M.D. Philadelphia: W. B. Saunders & Co.

This new book on epilepsy by Dr. Spratling, superintendent of the Craig Colony for Epileptics at Sonyea, New York, can be confidently recommended as a sound and reliable one. It is the result of nearly ten years' experience at Sonyea, and that this work has been conscientious and thorough, from the medical point of view, is abundantly shown all through the book. The large number of cases of epilepsy which has passed through his hands enables him to speak on all aspects of the disease, from the standpoint of what he has himself seen. His definition of epilepsy is—a disease or disorder affecting the brain, characterised by recurrent paroxysms which are abrupt in appearance, variable in duration, but generally short, and in which there is impairment or loss of consciousness, together with impairment or loss of motor co-ordination, with or without convulsions. This is not very different from definitions already given by others. The essentials are the impairment of consciousness, and usually of motility. The classification he would like is one based on etiology, but he regrets that knowledge is not yet sufficiently far advanced for this to be profitably done at present. That based on symptomatology leads to four varieties—*grand mal*, *petit mal*, Jacksonian, and psychic. The classification he himself recommends is one based on the age at which the disease is established. This gives three varieties—that originating before the third year, that commencing between the fourth and twentieth years, and that appearing after the twentieth year. Fully 80 per cent. of all cases are found in the first two classes. These classes are further subdivided into specific forms. To decide in which of his main groups a case should be placed, a careful

history is essential, and an outline examination scheme is accordingly given, so that all the desired information may be obtained. He also gives a card, on which can be recorded the number and character of the fits from which a patient has suffered during a whole year.

Two chapters are devoted to etiology. In his experience, similar heredity was traceable in 16 per cent. out of 1070 cases. In the same series, dissimilar heredity was also investigated; and in the case of alcoholism 14 per cent. were found to show this influence, insanity 7 per cent., and phthisis about 14 per cent. The author's opinion is that the last of these may grant a predisposition to some forms of epilepsy. As regards the influence of heredity on the age at which the epilepsy manifests itself, he states that the more unfavourable the heredity the lower is this age. The influence of cerebral palsies, dentition, fevers, emotional shock, trauma, and other factors is also discussed in this connection.

The next section of the book is devoted to seizure types. The investigations show that in 1325 cases 60 per cent. suffered purely from *grand mal*, 5½ per cent. from *petit mal*, only four cases from the psychic form, and nine from the Jacksonian. In the remainder the type varied in different seizures. The author gives descriptions of all the four cases of purely psychic epilepsy, which are most interesting in themselves, as well as from a medico-legal point of view. As regards frequency of attacks, over 56 per cent. have them weekly or oftener, and the hour at which they most frequently occur is at 2 or 3 in the morning. Status epilepticus is described by Dr. Pierce Clark. Then follows an interesting discussion of the forms of epileptic aura, which are considered under the headings of sensory, psychic, and motor. Dr. Spratling's experience is, that one out of every two epileptics have an aura of some kind. The sequelæ of the fits are then touched on. In this connection, the body temperature is of considerable importance. This point has been specially studied, and the results are here given. Out of 1000 observations, there were 516 *grand mal* seizures. In 57½ per cent. of these there was a rise of temperature immediately after the fit, varying from 0·2 to 3·5 F. In 15½ per cent. there was a subnormal temperature under the same conditions. Observations were also made half an hour and an hour later, and in 65 per cent. of these a rise occurred. Even after *petit mal* seizures there was in 60 per cent. of cases a rise of 0·2 to 2·5 F. immediately after. Half an hour later 70 per cent. showed a rise, while an hour later only 52½ per cent. showed any elevation of temperature. After purely psychic attacks, the temperature in 60 per cent. showed an immediate rise, which was more manifest half an hour, or even an hour, later. The conclusion he draws is, that the rise of temperature after a fit is not dependent upon the amount of muscular contraction which has occurred in it. In the status epilepticus, the temperature is invariably high, one case showing 107°·5 F.

Experiments made at Craig Colony, on the toxicity of the blood in epileptics, led to no conclusive results, but their number was small. As to prognosis, his experience is that 5 per cent. of his patients are curable. Chapter xii., on the pathology of epilepsy, is written by Drs. Prout and Clark, who have specially worked at this subject. Their general conclusion is, that the most striking changes presented by the

cortex are found in the cells of the second layer, which are distinctly sensory in type. The most important alteration is found in the nucleus of the cell, the intranuclear network being destroyed, and the nucleolus rendered a loose body within it. They regard the essential phenomena of the disease as being sensory in character, the motor manifestations being secondary. As regards its etiology, they consider that "it rests with a variety of toxic or autotoxic agents, not as yet definitely isolated or determined." The exact anatomic expression of the influence exerted by heredity is not known.

Treatment, both medical and surgical, is fully discussed. The former is particularly well done, and should prove of great assistance. As to the effects of trephining, the results were disappointing in his experience, and he does not advocate it except in certain well-defined cases.

The last two chapters are devoted to the psychological and medico-legal aspects of epilepsy. Like the rest of the book, they are carefully and well done. Throughout the volume there are a number of cases put on record which are both of utility and of interest, and various instructive illustrations are also given. There are several examples of bad grammar or careless proof-reading which one would have preferred not to find. But the author may be heartily congratulated on producing a really useful and instructive treatise.

Mental Defectives. By M. W. Barr, M.D. London: Rebman Ltd.

This book may be described as a sound practical treatise on the subject with which it deals. It is not by any means so scholarly and scientific as several other works which have already appeared on this branch of medicine. But such, it appears, is not the author's object. He addresses himself primarily to anxious parents and to earnest teachers. It is, however, rather doubtful whether information gained from a book will be of much service to the former, who presumably have had no experience in such difficult and trying work as the training of a child who suffers from congenital mental defect. A visit to a good institution, and a personal investigation of what is there done in this direction, would probably be a better use of an anxious parent's time than the mere reading of a book. The teacher already acquainted with the subject will derive much greater benefit from his reading, as he already has a good foundation on which to build the increased knowledge he acquires by so doing.

The opening chapters are devoted to definition, history, and classification. Under the latter the author recommends a practical division of cases depending on educability and the necessity for guardianship. Of mental defectives there are only two main kinds—idiots and imbeciles. The former are absolutely unimprovable, or are so to a very limited degree only. The latter are of three types—the mentally and morally defective, who is educable to a certain extent, but requires constant custodial care; the mentally defective, educable to a fairly high standard, but needing prolonged teaching and a colony life under protection; and the mentally slow, also demanding long and special training, and capable

ultimately of taking his place in the world. The classification is therefore based upon the final product rather than upon the present condition.

Under the head of etiology the author gives the result of an analysis of 5430 cases which have passed through his hands in the Pennsylvania Training School, of which he is the chief physician. The strongest predisposing causes "are those acting to transmit mental defect direct." Of these, 64·85 per cent. of the whole operated before birth, 2·92 per cent. at birth, and 32·23 per cent. after birth. A table is given in which the various factors operating in these three classes are individually considered, and their percentage of incidence stated. Dr. Barr is inclined to attach some importance to maternal impressions during gestation as influencing the child. One example he cites is that of a red-haired idot whose mother was chased during pregnancy by a cow. He fails, however, to mention what colour the cow was.

The most interesting and practically useful chapter is that on training. Many valuable hints may be gleaned from this. Kindergarten and manual training are the basis of most of the teaching. Under discipline it is noted that Dr. Barr believes in the salutary effect of slight corporal punishment, but this he keeps in his own hands. If resorted to at all, it should be without undue delay and suspense.

Dr. Barr's experience of craniectomy as a remedy for mental defect is by no means encouraging, and he is strongly of opinion that it is useless. On the other hand he as strongly recommends asexualisation, both to prevent increase of the weakminded among the population, and as a benefit to the patients themselves. His opinion, a practical one, is of value at the present time, when this same question is being discussed in our own country.

Special short chapters follow on cretinism, microcephalus and hydrocephalus, epilepsy, *idiots savants* and insanity, echolalia, and adenoma sebaceum. At the end a number of illustrative cases are given. The book is very finely illustrated with a large number of photographs of patients, but these are not arranged in a very satisfactory way.

A Text-book of Legal Medicine. By Frank Winthrop Draper. Philadelphia and London: W. B. Saunders & Co. 1905.

Dr. Draper is well known as professor of legal medicine at Harvard University, and a medical jurist of extensive experience. We have therefore read his book with interest, and can conscientiously congratulate him upon the production of an excellent students' manual.

It does not profess to be a complete text-book of medical jurisprudence, since the consideration of the important subjects of toxicology and the medico-legal relations of insanity have been purposely omitted by the writer, who is of opinion that these branches have acquired an importance deserving independent treatment by specialists. We regard this as an unfortunate view to take in regard to a text-book, such as this professes to be, "for medical students," and which makes no claim to an exhaustive consideration of the various subjects dealt with. It is surely advisable to provide the student with a text-book covering the

whole range of the subject, and not necessitate his having to consult special treatises.

The author is, however, the best judge of what is most suitable for the American student, and, after all, the matter is one of opinion. We have simply to deal with the book as it stands, and it can be stated without hesitation that students and the majority of practitioners will obtain from it a sound and clear impression of the principles of medical jurisprudence.

During our perusal we were constantly reminded of Vivian Poore's treatise on medical jurisprudence—not, however, in any sense derogatory to Draper, but merely by the style and originality exemplified in the mode of depicting the dry bones of the subject and expressing facts in fresh language without loss of lucidity or conciseness.

Like Vivian Poore's book, however, it conveys the impression of aiming too much at being a "popular" text-book, if one may use the term, and of being, in consequence, more adapted for the layman or lawyer than for the medical student. Perhaps this should not be regarded as diminishing its value as a text-book for the latter class, but at the same time we are inclined to think that several questions do not receive such full discussion in their purely scientific aspects as they deserve.

Considering the range of subjects dealt with in legal medicine, it is not a matter of surprise that inequalities in their treatment should be noticeable. The chapters dealing with medical evidence, identity, rape, and various questions connected with sex, leave little if anything to be desired, and are amongst the best in the book; while others, as, for example, those on "wounds" and "infanticide," suffer from omission or inadequate reference to questions of considerable medico-legal importance. This is more especially the case in chapter xxi., dealing with "wounds of regions," and in those chapters dealing with infanticide.

Amongst the smaller matters noted during perusal of the volume may be mentioned one which caused some surprise, namely, the fact that the author apparently entertains a belief in the growth of hair after death, or, at any rate, in the possibility of such an occurrence. We thought this myth had long since met the fate it deserved. We note also that that legendary masquerader in the likeness of a spermatozoon, the *Trichonomas vaginæ*, reappears unaffected by time and the fact that no one, except Donné, has ever suggested its liability to be confused with a spermatozoon, while few have ever had the good fortune to discover anything at all resembling its reputed description. There are some good and original illustrations, and also many reports of interesting cases derived from the author's experience, all adding to the value of a work which must be pronounced a welcome addition to medico-legal literature.

NOTES ON BOOKS.

The Rheumatic Diseases. By J. Odery Symes, M.D. London: John Lane.

Hysteria and Neurasthenia. By J. Mitchell Clarke, M.D. London: John Lane.

From the Bodley Head come the first two volumes of a new series—"The Practitioner's Handbooks." Dr. Odery Symes, who is responsible for *The Rheumatic Diseases*, seems to us to have succeeded admirably in giving a thoroughly clear, practical, and up-to-date exposition of his subject. He deals with acute rheumatism, chronic rheumatism, rheumatoid arthritis, and gonorrhœal and scarlatinal rheumatism, and very rightly devotes a special chapter to rheumatism in the child. A specially commendable feature is the attention paid both to principles and details of treatment, in which Dr. Symes sets a good example to many writers of more ambitious monographs.

In *Hysteria and Neurasthenia*, Dr. Mitchell Clarke has compressed within a very moderate compass a succinct, and, so far as it goes, complete account of these disorders. We should gladly have seen more reference to recent work on the differential diagnosis of functional from organic paralyses, and, though no doubt this omission is intentional, to the various views of continental authorities on the pathogenesis of hysteria. One does not feel that to ascribe the disease to disordered function of the cerebral cortex explains much. The chapter on treatment is well done, and the very explicit directions as to the dieting of Weir Mitchell cases should prove most serviceable. There is also a chapter on hysteria in childhood, in which its monosymptomatic character is recognised. Dr. Clarke's book may be recommended as a practical compendium of its subject.

International Clinics. Fifteenth Series, Vol. I. Philadelphia and London: J. B. Lippincott Co.

Under the able editorship of Dr. Kelly the new volume of "International Clinics" maintains the high level of recent years, and the seventeen papers it contains cover a wide range of topics of practical interest. Chauffard of Paris contributes a valuable article on the "Treatment of Infected Cholelithiasis," from which no one who has to deal with one of this most perplexing class of case could fail to derive a hint as to the proper moment for surgical intervention. There is an interesting paper on "Carbohydrates in the Urine" by Carstairs Douglas, while, under the head of surgery, we find papers on "Skin

Grafting" by Archibald Young, and on the "Treatment of Visceral Ptoses" by Gallant, the latter of which is full of practical advice. The single contribution on obstetrics, from the pen of Dr. Jardine, deals with the management of labour in flattened pelves; his contention that only anterior parietal presentations are suitable for forceps delivery, and that posterior cases should be turned, appears as being highly reasonable. Space forbids enumeration of all the papers in the volume, which concludes with a retrospect of the advances made in 1904. In this section Dr. Bloodgood's review of surgical progress merits special notice.

The Transactions of the American Dermatological Association, 1904 (New York: The Grafton Press) may be regarded as a sort of conspectus of the burning questions of the day in this branch of medicine. One can pretty well gather from their perusal what subjects are agitating the minds of the profession, and cull from their pages amusement as well as instruction. Of the former, an instance is the paper by the veteran J. C. White, "Concerning Domestic Remedies formerly used in Skin Diseases." When reading it one is carried back to the epoch of one's boyhood and beyond, and though some terms are employed unfamiliar to us on this side of the Atlantic, the remedies are much the same, survivals of our common ancestry. A paper by Corlett should prove nuts to the anti-vaccinationists, who must be rather hard up for fresh material—"Notes on certain Post-vaccinal Eruptions." It is so easy to pervert language and to gloss over incalculable advantages by bringing into prominence some trivial accidents. It would be surprising if vaccination did not at times give rise to side issues, and some of these are admirably presented and illustrated in the article in question. Fordyce and Engmann make separately valuable contributions to our knowledge of affections of mucous membranes in relation to skin diseases, with a copious bibliography. These are but samples taken here and there from a most excellent series of articles, full of instruction to all classes of our profession.

RECENT ADVANCES IN MEDICAL SCIENCE.

MEDICINE.

UNDER THE CHARGE OF

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The Etiology of Syphilis.

The discovery of the causal agent of syphilis has often been proclaimed, and as often, time has failed to substantiate the discovery. It almost seems now, however, as though the riddle had been solved, and that we must henceforward relegate syphilis to the group of maladies due to protozoa. Since last March, when Schaudinn and Hoffmann's preliminary communication appeared, their observations have received ample confirmation from many sides, and it may now be regarded as certain that in the primary and secondary lesions of syphilis, a special organism, apparently peculiar to the malady, can be fairly readily detected by suitable methods, and, moreover, that in the syphilis produced in apes by inoculation with virus from chancres, the same organism is present. This *Spirochæta pallida*, as its discoverer has named it, has not yet been cultivated outside the body, so that the evidence of its etiological relationship to syphilis is necessarily not yet complete; the following abstracts of some of the numerous papers which have appeared on the subject within the past few months, will show, however, that there is considerable presumption in favour of its being the true cause of the disease.

While the credit of the identification of *S. pallida* is undoubtedly due to Schaudinn and Hoffmann, it seems as though another observer, Siegel, was on the track of the same discovery. Siegel, who was working on the protozoa in connection with vaccinia, scarlatina, and foot-and-mouth disease, described (*München. med. Wchnschr.*, 1905, July 11 and 18) a nucleated flagellate body in syphilitic lesions both in man and in apes. To this he gave the name *Cytorrhyctes luis*, and (it is said) it was while endeavouring to verify or contradict Siegel's work that Schaudinn identified the *S. pallida*.

Spirochæta pallida in syphilis (Schaudinn and Hoffmann, *Berl. klin. Wchnschr.*, 1905, May 29).—The spirochæta group of micro-organisms must not be confused with the spirilla, which are fission fungi, while the former are much more primitive forms (*Urtiere*). In appearance the *S. pallida* resembles a thin, spirally twisted thread, which can move backwards or forwards by rotating in a corkscrew fashion round its

longitudinal axis; in addition to this motion, undulations course along the whole structure, which bends to and fro with lashing movements, and does not, like a spirillum, possess a rigid longitudinal axis. *S. pallida* is distinguished from other forms by its small size and low refractive index, and by the coils of its spiral being numerous, deep, and closely set as compared with those of the *S. refringens*, which is common in all inflammatory conditions of the glans and prepuce. *S. pallida* is also very resistant to aniline dyes, the best stains being Giemsa's solution or fuchsin and gentian-aniline water. This organism has been found in seven primary sores, and in nine condylomata excised with aseptic precautions. The cases selected showed little or no erosion of the surface, and the spirochætæ were obtained from the deeper parts. The observers also obtained it from the indolent bubo of twelve cases of recent syphilis, both by excision of the glands and puncture, as well as in the splenic blood during the eruptive stage. Since their preliminary communication was made, Metchnikoff and Roux have detected the spirochæta in infected apes. Among other forms of spirochætæ are *S. refringens*, found in genital warts, balanitis, etc., *S. buccalis*, spirochæta of Vincent's angina, *S. obermeieri*, *S. anserina* (goose septicæmia), and the spirochæta of so-called fowl spirillosis.

Spirochæta pallida in congenital syphilis.—Babes and Panea (*Berl. klin. Wchnsch.*, 1905, July 10) performed a post-mortem on the body of a 4-weeks-old infant who died from hæmorrhagic congenital syphilis. The mother displayed marked signs of the disease, and *S. pallida* was obtained from condylomata on her vulva. The writers made smear preparations from most of the infant's viscera, and detected *S. pallida* in the liver and spleen. In another case of a syphilitic infant, dying immediately after birth, the organism was found in blood from the heart, subarachnoid fluid, smears from the lungs, spleen, liver, and glands, and, most abundantly of all, in the suprarenal glands, films of which often showed as many as twenty spirochætæ in a field. The best staining was got by Romanowsky's method, prolonged for at least fourteen hours. Babes and Panea end their paper by pointing out that the detection of the spirochæta immediately after death, unassociated with any other organism, and chiefly in the deeper tissues and most severely affected organs, is confirmatory evidence that the organism is specific, not merely saprophytic.

Levaditi (*Presse méd.*, Paris, 1905, May 31) has also investigated the occurrence of *S. pallida* in hereditary syphilis. The organism has an average length of 7 μ and a thickness of 0·5 μ; it may be stained thus: Smear preparations are fixed in absolute alcohol, ten to thirty minutes, and then stained for from twelve to sixteen hours in Giemsa's solution, 10 drops, water 10 c.c. It appears as a pale lilac structure. Levaditi examined three cases: in the first he found the spirochæta in the papules and vesicles of the rash; in the second, in the spleen, lung, cutaneous papules, and liver; in the third, in the spleen, liver, and fluid from pemphigus vesicles. The organism is present in the papules in the earliest stage. It is most abundant in the liver, because it enters the fœtus from the placenta, and in the first instance passes into the hepatic circulation. Levaditi, too, regards the presence of the spirochæta in congenital syphilis as strong evidence of its pathogenicity.

Ploeger (*München. med. Wchnschr.*, 1905, July 18), in the course of a general review of the subject, gives as the distinction between spirochæta and spirilla the characteristic mobility and undulatory membrane of the former. The chief organism from which *S. pallida* has to be distinguished is the larger *S. refringens* found in genital ulcers of all kinds, which resembles the spirochætæ already known to occur in hospital gangrene, noma, phagedæna, angina Vincenti, ulcerative stomatitis, etc. The measurements of *S. pallida* are: length 4 to 14 μ, breadth $\frac{1}{4}$ μ or less; its convolutions number from 6 to 20, and each measures from $\frac{2}{3}$ to $1\frac{1}{3}$ μ. Mobility remains for six hours in physiological salt solution, but is lost in five to ten minutes in glycerin. As the simplest method of staining, he advises plunging the unfixed preparation for one minute in concentrated alcoholic solution of gentian violet, 1, $2\frac{1}{2}$ per cent. carbolic acid 10, and then washing thoroughly. The organisms are tinged faint lilac colour. Ploeger's observations confirm those already noted; he also gives a record of negative and control experiments. Thus the spirochæta has not been found in gummata nor in the nasal secretion of congenital syphilis; it has not been identified in vaginal secretion, smegma, balanitis, venereal warts, soft sores, non-syphilitic ulcers and erosions of the penis, bubo, leukæmic and tuberculous glands, splenic pulp of healthy people, molluscum contagiosum, pus, psoriasis, scabies, acne, lupus, carcinoma, or sarcoma.

Ranbitschek (*Wien. klin. Wchnschr.*, 1905, July 13) found the organism in the circulating blood in a case of florid secondary syphilis.

Rille (*München. med. Wchnschr.*, 1905, July 18), in a general review prior to quoting his own confirmatory observations, brings out one or two fresh points. In 1904, Metchnikoff, in his third study of syphilis in the ape, suggested that a spirilla might be the cause of the disease. This was on the ground of some observations of Bordet, but it was only after Schaudinn's work was published that he obtained confirmation of his hint, finding spirochætæ in four out of six inoculated apes. Kraus of Vienna has shown that, while it is easy to detect the spirochætæ in a freshly excised chancre, they cannot be made out if the tissue has been kept on ice for twelve hours or more. This agrees with what is already known as to the great sensitiveness of the syphilitic virus to changes of temperature. While the discoverers in their first publication spoke very guardedly as to the etiological significance of the spirochæta, Metchnikoff is much more decided, and regards syphilis as in all probability a chronic spirillosis due to Schaudinn's organism. There is no doubt that *S. pallida* is an almost constant accompaniment of recent syphilitic lesions. Among fruitful lines of research, not, so far, carried out, would be the quest for the organism in the blood in cases of pre-eruptive syphilitic anæmia, in cases of secondary syphilitic fever, and in the pustular eruption of malignant syphilis. Schaudinn has discovered that one species of spirochæta (*S. ziemanni*) is merely the asexual stage in the life cycle of the trypanosome of the stone-owl; he believes that all spirochætæ are also protozoa, and only stages in the life histories of flagellata. Until recently, trypanosomes and spirochætæ were unknown except as blood parasites, but Wright has recently proved, by his discovery that a trypanosome causes oriental boil, that this group of organisms may produce inflammatory granulation tissue.

These continental observations have been confirmed by M'Weeney (*Brit. Med. Journ.*, London, 1905, June 10), who demonstrated *S. pallida* in nine cases of primary and secondary syphilis. He gives the length of the organism as averaging 12 μ, and the coils as 7 or 8, opening out towards the ends. In some specimens there was a trace of an undulatory membrane; in others a granule (? nucleus) could be seen. The organisms are Gram-negative, and stain poorly with carbol-fuchsin; Giemsa's mixture gives best results. They are probably allied to chromatin in structure. *S. pallida* is extra-cellular, but is sometimes attached to a pus cell, having one extremity embedded in the protoplasmic body, which its vigorous movements cause to sway to and fro. Bearing in mind that one species of spirochæta at least is a stage in the cycle of a trypanosome, it is suggestive that the sexual disease of the horse (not unlike syphilis in some ways), known in France as dourine or *mal de coït*, is due to a trypanosome, and that the infective agent is conveyed by direct contact even through unbroken mucosa, without the assistance of the usual intermediate invertebrate host. Further, kala-azar, a disease caused by Leishman-Donovan bodies, which are also a stage in the life cycle of a trypanosome, has recently been shown to be communicable by sexual congress.

S. pallida in cerebro-spinal fluid.—Gordon (*Am. Med.*, Phila., 1905, July 22) examined the cerebro-spinal fluid of eight cases of tabes and cerebro-spinal syphilis, with negative results. Of two recent cases, however, one with a chancre of twelve days', the other one of four weeks' duration, he found the organism in the latter.

Galli Valerio and Lassueur (*Rev. méd. de la Suisse Rom.*, Geneva, 1905, July 20) have investigated eight cases of secondary and two of tertiary syphilis. They found the spirochæta in the majority of condylomata and mucous patches, but not in gummata. They were able to stain the organism by twelve hours' treatment either with Romanowsky's solution or Michaelis' blue, but the preparations faded rapidly. Herxheimer and Hubner (*Deutsche med. Wchnschr.*, Leipzig, 1905, June 29) failed to detect the organisms in the general circulation in secondary syphilis, and in the organs of an hereditary syphilitic fœtus, though they could always recognise them in primary and secondary lesions. The spirochætæ are most readily visible in hanging-drop preparations, using a $\frac{1}{12}$ in oil immersion and a medium eye piece. Almost the only strong opponent of Schaudinn's theory is Thesing (*München. med. Wchnschr.*, 1905, July 11), who makes the following criticisms of his work:—(1) The spirochæta is a bacterium, not a protozoon, because it has neither nucleus, flagellæ, nor an undulatory membrane. (2) The alleged specific differences between *S. pallida* and *S. refringens* are inadequate. (3) Schaudinn's specimens showed so many other organisms as to suggest extraneous contamination, *e.g.*, from the stains used.

Staining methods.—Giemsa's most recent and approved mixture has the following composition (*Deutsche med. Wchnschr.*, 1905, June 29):—Azur II.-eosin, 3 grms.; Azur II., 0·8 grm.; Merck's chemically pure glycerin, 250 grms.; methyl-alcohol (Kahlbaum I.), 250 grms. This mixture is manufactured by Grubler, and never contains saprophytes. It is used thus: Fix thin air-dried smears for twenty minutes in absolute alcohol; dry with filter paper. Drop the stain into distilled water,

1 drop to 1 cm., shaking the while. *At once* pour the dilute stain over the preparation, and stain for ten to fifteen minutes. Wash in running water, dry, and mount. For spirochætæ it is sometimes advisable to have a minute trace of potassium carbonate in the water used to dilute the stain. Davidsohn (*Berl. Klin. Wchnschr.*, 1905, July 31) advises as superior to Giemsa's mixture simply staining for half to one hour in saturated watery solution of kresyl-violet.

SURGERY.

UNDER THE CHARGE OF

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On the Danger of Phosgene Gas evolved during the Administration of Chloroform.

The inconvenience resulting from the evolution of phosgene gas during the administration of chloroform has long been familiar to operating surgeons, but its dangers have not hitherto, we think, been sufficiently appreciated. Armand and Bertier of Lyons call attention to these in the paper before us (*Rev. de Chir.*, Paris, 1905, July). This gas is produced when chloroform vapour is introduced into the atmosphere of a closed room which is lighted by gas. During last winter, in the clinic of Professor Villard, the authors observed that the assistants were often seriously incommoded by a pungent sensation in the throat, by congestion of the conjunctiva and lachrymation, and by a troublesome tickling of the larynx, followed by violent spasms of convulsive coughing. These symptoms were most common when a series of patients were anæsthetised, one after the other, with chloroform. In most cases they were slight and merely disagreeable, but on one occasion one of the assistants was so ill that he had to leave the theatre suffering from pain in the head, convulsive cough, and a feeling of general lassitude, which persisted during the rest of the day. It was interesting to observe that the patients did not cough, and appeared to be less influenced by the gas than the assistants. In some cases, however, they suffered from alarming interference with respiration, and serious obstruction of the air passages by excess of mucus. The authors observed that when these irritative phenomena appeared, the air of the room was charged with a whitish vapour, so evident as to form a slight haze.

From a search through the literature, the authors have collected a number of observations similar to their own. While the patient, as a rule, does not suffer from the irritative effects of the phosgene—doubtless because of the chloroform abolishing his reflexes—there is evidence that he frequently suffers from general toxic effects. The authors have carried out experiments on animals which demonstrate the poisonous nature of the fumes, and records are quoted which show that serious and prolonged illness, and in some cases even death, has resulted from inhalation of phosgene.

After describing their experimental observations, which fully confirm clinical experience, the authors draw the following conclusions :—(1) That the combustion of illuminating gas in a closed space in which are present the vapours of chloroform, or of any mixture having chloroform as a basis, produces poisonous gases, which, when they are in considerable quantity, rapidly kill animals. (2) The gases manifest their presence by forming a whitish vapour, and by causing irritation of the mucous membranes, particularly those of the respiratory tract, varying in severity according to the proportion of the gases present, and affecting different people unequally. (3) The poisonous gas is not carbonic oxide, but is chloroxycarbonic acid, or phosgene (the name given to it by Sir Humphry Davy), and it acts directly on the blood. (4) The prophylaxis of these accidents consists in banishing from rooms in which chloroform is administered all flames burning in the open air, and of which the products of combustion are left behind. If these products are at once carried away, the risk is materially diminished. All danger can be avoided by employing electric light for the illumination of the operating theatre, and by proscribing the use of Bunsen burners for any purpose whatever. If we must operate by gas-light, the burners should be placed as high as possible, and the room must be freely ventilated. If this is impossible, then ether, despite its inflammability, should be used in place of chloroform. It is probable that a certain number of chloroform accidents, of which the cause has not been found, may be traceable to the effects of the inhalation of phosgene.

[In a footnote the authors mention that they have not experimented with paraffin lamps or candles, but they state that some writers maintain that the burning of paraffin is even more dangerous than that of coal gas. This, as well as the facts brought out in the paper, the present abstractor can fully confirm, from a short experience with a paraffin stove introduced to improve the heating of a small operating theatre. On the first and only occasion in which this was used, all the assistants were seriously affected by the vapours, and one had to be helped from the room in a state bordering on collapse. The operation, an emergency laparotomy, was completed with difficulty, and the patient suffered considerably from the effects of phosgene.—Abstractor.]

Direct Cystoscopy.

Dr. George Luys describes (*Ann. d. mal. d. org. génito-urin.*, Paris, 1905, July 15) a new cystoscope, by means of which the interior of the bladder may be examined by direct vision, instead of with the aid of a prism, as in the forms now generally employed. This new instrument may be used for the examination of the male as well as of the female bladder. It consists of a metallic tube, 18 cms. in length for the male, and 10 cms. for the female. In the inferior wall of this tube is a small pipe, through which the urine is aspirated, with the aid of a Potain's aspirator, or by syphon action, while the bladder is being examined. This auxiliary is of great importance, as it ensures that the bladder shall be empty and dry during the examination, and is superior to the method of periodically withdrawing the urine, as in Kelly's procedure. In the interior of the endoscopic tube, near its point, is a small electric lamp,

by which the bladder is illuminated. In front of the outer opening of the tube is a movable lens, by means of which the object under examination may be magnified. The patient is placed in the Trendelenburg position, and the urethra having been opened by the passage of the tube, the bladder is moderately distended by the entrance of air, after the principle suggested by Kelly.

The author claims for this instrument the following advantages:—The view is direct, and the object viewed is seen in its actual position, form, and relations, instead of being reversed, and sometimes distorted, as when the prismatic optical mechanism is employed. The procedure is greatly simplified, and useful information may be obtained by any one, without the extended experience which is necessary in the use of the prismatic instrument. The necessity for filling the bladder with fluid, or with air under pressure, is obviated, and in this way the mucous membrane is seen in its natural state, and without being rendered anæmic by the artificial distension. Further, it is claimed that by the direct method an inflamed or contracted bladder, which would not admit of the distension necessary in the employment of the prismatic instrument, may be satisfactorily examined.

The presence of marked pyuria, hæmaturia, or turbid urine does not preclude the use of the cystoscope. Another important advantage of the instrument is that it enables the surgeon to apply local treatment directly to lesions in the bladder wall. Lastly, and it appears to be one of the strongest points in favour of the direct method, the ureters can be catheterised with great ease by bringing the end of the tube directly over the ureteral orifice, and so introducing the catheter directly under the guidance of the eye, and with a diminished risk of carrying infective material from the bladder into the ureter.

While advancing these claims for his instrument, the author does not deny that it has certain disadvantages as compared with the cystoscopes at present in vogue. First, the calibre of the instrument is somewhat larger than that of the prismatic cystoscope, but this objection may be got over by dilating the urethra, and, after all, it is not a serious one. Secondly, the field under observation is more limited, but, as the instrument can readily be moved about, this objection need not be insisted upon. In this connection, Tuffier is quoted to the effect that "what we do see, we see very clearly." Thirdly, it has been said that the parts about the neck of the bladder cannot be satisfactorily viewed by this instrument. The author states that by manipulating the instrument any portion of the vesical mucous membrane may be investigated, and that the instrument may even be used as a urethroscope. Delbet and Tuffier have expressed eminently favourable opinions of this apparatus.

Ligature of the Innominate Artery.

A successful case of ligature of the innominate artery, making the eighth on record, is reported by Mr. William Sheen of Cardiff (*Ann. Surg.*, Phila., 1905, July). The patient was an ex-soldier, æt. 46, who suffered from an aneurysm of the second and third parts of the right subclavian artery, the symptoms of which commenced six months

before the patient was admitted to hospital. On the last day of March 1904, the innominate and right common carotid were tied, and the pulsation in the aneurysm ceased, but returned to some extent the following day. In the middle of May another attempt was made to ligature the innominate without success. On the 2nd June the second part of the subclavian was tied close up to the aneurysm. Recovery took place with consolidation of the aneurysm, and the patient remained well when last seen, eight and a half months after the first operation.

In reporting this case, the author gives brief abstracts of thirty-six cases in which the operation has previously been performed, and of seven cases in which unsuccessful attempts were made to ligature the vessel. Eight of the operations were followed by cure of the aneurysm. Of the fatal cases, death resulted in thirteen from hæmorrhage associated with suppuration in the wound, and in a considerable proportion of these the fatal issue seemed to have been favoured by the presence of a drainage tube in the wound. In three cases, sepsis alone was the cause of death. Three cases proved fatal from cerebral lesions, and in several others cerebral symptoms were present. The three remaining fatal cases died from acute pericarditis, suppuration in the right kidney, and broncho-pneumonia respectively. From a study of the records, the author concludes that in properly selected cases ligature of the innominate is a reasonably safe and undoubtedly useful operation. The cases suitable are those in which the aneurysm is of a circumscribed and globular character, and the general condition of the patient is otherwise good. Fusiform aneurysms are unsuitable for ligature. The maintenance of asepsis is the main factor in obtaining a successful result. The incision should be central, with horizontal and vertical division of the manubrium, if necessary. The carotid should be tied, as well as the innominate. Silk is the best ligature material, and some amount of injury to the inner coats is probably necessary to ensure occlusion. Two ligatures should, if possible, be placed round the vessel, the first turn of the proximal ligature being held tight, so as to keep back the blood while the distal ligature is being completely tied. The use of a drainage tube is inadvisable. The advisability of tying the carotid about a fortnight before the innominate as a means of obviating some of the risks of cerebral complications, is suggested. The "Valsalvan" methods of treatment immediately prior to operation are inadvisable.

OBSTETRICS AND GYNÆCOLOGY.

UNDER THE CHARGE OF

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Pathogenesis of Eclampsia.

Dienst (*Centralbl. f. Gynäk.*, Leipzig, 1905, No. 12) suggests that the cause of puerperal eclampsia may be sought in an abnormal communication

between the circulatory systems of mother and fœtus. He found that methylene-blue, injected into the umbilical cord immediately after delivery, caused the mother's urine to show traces of the stain in about a fifth of the cases. Milk injected into an umbilical artery or vein likewise oozed from some of the larger vessels on the maternal surface of the placenta. His experiments were made with placentæ from fifteen eclamptic women, and also with 355 placentæ from normal childbirths. In 160 women thus tested, one-fifth showed this phenomenon of blue urine. He further experimented with mixtures of the blood of mothers and fœtuses in 118 cases. In twenty-four instances he found that the maternal blood agglutinated or dissolved the fœtal blood, acting like a heterogeneous blood. In fifteen of those women the urine showed no trace of the stain after injection of the methylene-blue into the placental vessels. All of those had normal confinements. The other women showed the blue urine, and seven had developed eclampsia, while the other two had had severe albuminuria. Dienst proposes, therefore, that eclampsia is the effect of transfusion of the heterogeneous fœtal blood into the maternal circulation, which is the effect of abnormal permeability of the placenta.

Cholecystitis in the Puerperium.

Christiani (*Monatschr. f. Geburtsh. u. Gynäk.*, Berlin, No. 1) believes that the rarity of reported cases of this condition after childbirth is due to the difficulty of differentiating such an affection. He describes two cases, showing that fever in the puerperium may be due to this condition or appendicitis. He advises early operation in those conditions during the puerperium. The possibility of involvement of the liver is more menacing during pregnancy and the puerperium than at other times. Both his cases, however, recovered under internal treatment alone. The signs on which he relied to exclude puerperal pyæmia were the frequent bilious vomiting with slight peritoneal irritation, and the full, slow pulse. Pinard has reported three cases cured by operation.

Histological Diagnosis of Incipient Tuberculosis of the Uterus.

Schottlaender (*Monatschr. f. Geburtsh. u. Gynäk.*, Berlin, No. 1) thinks the discovery of a tubercle is not necessary for the diagnosis of the condition. The discovery of a few epithelioid cells, surrounded by giant cells, is a clue. He has examined the curettings of every patient, regardless of the clinical history. In ten cases he found changes in the epithelium. In some of those cases there was a concomitant tuberculosis elsewhere, but the findings were evidently not specific for tuberculosis, as they occurred in healthy patients after abortion or normal delivery. His research further demonstrated that the reaction to the presence of tubercle bacillus is not invariably in the line of the presence of tubercles. The reaction may be merely tissue changes of indeterminate character, and not those generally regarded as typical of tuberculous processes.

Lumbar Anæsthesia in Gynæcology.

Muller (*Monatschr. f. Geburtsh. u. Gynäk.*, Berlin, No. 1) favours spinal anæsthesia for gynæcological operations which do not involve opening the peritoneum. He reports twenty cases. The anæsthesia was complete for operations of an hour's duration. When the peritoneum was involved, the anæsthesia was less reliable, but a few whiffs of chloroform rendered it complete.

A Case of Menstrual Urticaria.

Miller (*Med. Rec.*, N.Y., vol. lxvii. No. 19) epitomises the literature of this condition, and reports its occurrence in a girl, æt. 15, who menstruates regularly, and whose attacks of urticaria make their appearance seven or eight days before, and cease two or three days before, each period. Occasionally the urticaria persists until the flow begins; rarely during the first day or two of its course. During the intervals between the periods the patient is quite free from attacks, and is perfectly healthy in other respects. The urticaria itself is of the ordinary type.

Tuberculosis of the Female Generative System.

Thomson (*Monatschr. f. Geburtsh. u. Gynäk.*, Berlin, Bd. xxi. Heft 4) reports five cases—two certainly primary, one doubtful, and two associated with tubercle elsewhere. The first three cases affected the tubes; the fourth appeared to affect primarily the ovary. This latter is rare. The ovary was removed per vaginam, so that the exact condition of the peritonium was not determined. The patient, however, was well four years after removal of the affected ovary. The last case ended fatally, and was complicated with tuberculous disease of distant organs.

Primary Cancer of the Fallopian Tube.

Orthmann (*Ztschr. f. Geburtsh. u. Gynäk.*, Stuttgart, 1905, Bd. xiv. Part 1) reports the case of a woman, æt. 49, who complained of dysuria and constipation. On abdominal examination, a tumour the size of a child's head was discovered in the left side of the abdomen. The peritoneal cavity was filled with blood-stained fluid. The tube was extensively invaded with papillomatous cancer. A year later an exploratory operation was performed for recurrent growths, which were found to involve peritoneum and omentum. About sixty cases of primary cancer of the tube have been collected.

THERAPEUTICS

UNDER THE CHARGE OF

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Treatment of Migraine.

Carriere (*Presse méd.*, Paris, 1905, July 19) holds that all migraine sufferers are of the gouty diathesis. Treatment must therefore take into consideration the constitutional state, the presence of any abnormality, functional or organic, and also the nature of the causes which induce the actual attacks.

The constitutional treatment is dietetic. The diet should aim at minimising the risk of rendering the blood rich in uric acid, and must also avoid the risk of auto-intoxication of gastro-intestinal origin. The diet must be plain; beef, mutton, and poultry are allowed, together with farinaceous foods and all vegetables and fruits which are not very acid. During a period when the attacks are very frequent, it is well to restrict the diet to milk, eggs, and farinaceous or vegetarian food.

The most useful drug to lessen the tendency to migraine is a prolonged course of cannabis indica. Small doses of an aqueous-alcoholic extract should be made up into pill form. A pill containing $\frac{1}{4}$ gr. of the extract should be taken every evening at bedtime for a month. If at the end of that time amelioration has not been obtained, the dose may be raised to two pills, which may be taken for fifteen days, and then reduced to one pill for another period of fifteen days, and so on alternately. In very obstinate cases it may be necessary to take an additional pill in the morning. Along with the cannabis indica hot douches may be combined. The water should be very warm, and the head and neck should not be included, but the douche should be applied chiefly to the lower part of the body. It may be followed by cold affusion to the feet. These douches must be kept up for at least thirty days if any good is to be got from them.

In most cases of migraine it will be found that there is some local trouble either of the gastro-intestinal or genital tract. Such disorders must be carefully sought for and removed. The actual causes which produce an attack vary in different individuals, but, if possible, they should be ascertained and avoided. Frequently they will be found to be dietary indiscretions, but in other cases changes in the weather, the use of tobacco, or sleeping in ill-ventilated bedrooms, will be found to be the determining cause of the attacks.

During the actual attack treatment is rather helpless. Occasionally the use of the warm douche, followed by absolute rest for some hours, succeeds in cutting short an incipient attack. Carriere has given up all internal drug treatment during the actual attacks, but he recommends the application of frequently changed very warm dry cloths to the

head alternately with the use of the following analgesic mixture:—Menthol, chloroform, methyl-salicylate, of each 5 parts, with 30 parts of lanolin. Finally, in excessive paroxysms of pain, especially towards the evening, a sedative injection of quinine 7 grs., antipyrine 15 grs., laudanum 10 minims in 1 oz. of gruel, may induce sleep, during which the attack passes off.

Ergot.

Sollmann and Brown have investigated the action of intravenous injections of ergot. They experimented on dogs. The immediate effect is a marked fall of pressure, which is followed by a rapid recovery, and, as a rule, there is even a slight transient rise of pressure. The changes seem to depend chiefly on the heart. There is no marked vaso-constriction, and the authors conclude that the drug is not a suitable one for affecting the general circulation.—*Journ. Am. Med. Ass.*, Chicago, 1905, July 22.

Wiring and Electrolysis in Aneurysm.

Hare has already used this method in eight cases, and now reports a further series of three, two of which were thoracic aneurysms and one a sacculated aneurysm of the innominate artery. The method used was to insert an insulated needle into the tumour and introduce the gold wire, of which 2–8–9 ft. were used respectively in the three cases. The current starting at 5 milliampères and gradually increasing to 50 milliampères was allowed to flow for thirty to forty-five minutes. The immediate result of the operation in each case was successful. There was immediate relief of the pressure symptoms and a diminution in the expansile pulsation of the part operated on. The degree of relief varied very considerably, but all the patients experienced some benefit. After a period of improvement lasting several months, all the patients died, but this indicated only that the disease in the blood vessel was so extensive that though the point of greatest weakness had been strengthened by a firm clot, the vessel eventually gave way at the edge of the clot and at a place where operative interference could not well be undertaken. In each instance the operation prolonged life. It was performed under desperate conditions, and the fact that it does not produce a permanent cure in no way militates against its use.—*Therap. Gaz.*, Detroit, 1905, July 15.

Action of Radium.

Werner reports some interesting observations on the action of radium in the growth of bacteria and on the healing of wounds. He finds that radium has a bactericidal action on micro-organisms. It is best seen if the exposure takes place immediately the culture medium is infested. If the growth has already started, much more prolonged exposure is required to kill the organisms. The more rapid growing forms succumb somewhat easier than slowly growing varieties. He has further discovered that not only does radium kill bacteria, but it also seems to

reduce the toxic action of the killed growths, since animals can withstand two or three times the fatal amount that killed, if the culture was killed by heat. Despite this diminished virulence of the toxines and endotoxines, the injection of the radium-killed bacteria is followed by the production of extremely powerful bacteriolytic serum, which is even to a slight degree antitoxic.

The action of radium is of no value for sterilising infected wounds, partly owing to its feeble penetrating power and partly owing to the fact that the bacteria are much less sensitive than the tissue cells, so that it is impossible to avoid burns. Lastly, he found that the tissue cells of all varieties killed by the action of radium themselves develop bactericidal properties.—*München. med. Wchnschr.*, 1905, No. 34.

MEDICAL JURISPRUDENCE.

UNDER THE CHARGE OF

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The Diagnosis of Death by Drowning.

No subject in forensic medicine has recently undergone such important advances as that relating to the diagnosis of death by drowning. Revenstorf has truly said that the proof of the presence of inspired fluid in the lungs possesses as great a diagnostic importance in death by drowning, as the detection of the poison in the stomach in a case of poisoning. It is no longer doubted that the water in drowning passes far down into the air passages, and that once into the alveoli of the lungs the fluid must pass into the blood of the capillaries and from this through the pulmonary circulation into the general blood stream.

In cases of death by drowning, therefore, the blood of the left side of the heart, which is thus being constantly mixed with water, will be found markedly diluted as compared with the blood of the right heart. Brouardel and Loye first attempted in 1889 to prove the presence of this dilution of the blood of the left side of the heart by means of the determination of the solid residue of the blood. Paltauf in a like attempt availed himself of the method of estimating colorimetrically the amount of hæmolysis; while later Brouardel and Vibert made another attempt to prove the dilution by a count of the red blood corpuscles. In 1901, Carrara hit upon the idea to determine the difference in the concentration of the blood on the right and left sides of the heart by means of cryoscopy, and most interesting results have ensued from his researches, and also from those who have followed him in the same line of investigation, as, for example, Revenstorf, Stoenescu, Wachholtz, and Horoszkiewicz. Experiments by means of the cryoscope showed, almost without exception, a difference in the blood of the right and left sides of the heart in animals which were drowned, the freezing-point (Δ) of the blood of the left heart being uniformly higher than that of the blood of the right heart.

This held good in fresh water, but, of course, owing to the higher

molecular concentration of sea water, the opposite relationship was found to exist in drowning in the latter fluid. In animals which were placed in water after death, no such difference in the blood of the two sides of the heart was found, indicating that the circulation had stopped when the bodies were placed in the water, and that water which had found its way post-mortem into the air passages did not pass into the blood under such circumstances.

Cryoscopy, therefore, seemed to afford a most valuable means for the diagnosis of death by drowning. Unfortunately, however, certain facts invalidate its universal diagnostic application. In the first place, it is found that a difference in the freezing-point of the blood on the two sides of the heart may not be present in cases of undoubted death by drowning, a circumstance which, Carrara explained, and his hypothesis is also concurred in by Wachholtz and Horoszkiewicz, by the theory that the absorption power of the lung tissue becomes exhausted before the stoppage of the circulation in these cases, so that, as the circulation continues after this exhaustion, an equalisation in the concentration of the blood on the two sides of the heart takes place before death occurs.

The second cause detracting from the value of the method is putrefaction. Cryoscopy of the blood can only afford reliable proof of the fact that water has passed into the lungs of a living person so long as the body is quite fresh. Revenstorf's investigations show that a period of twenty-four to forty-eight hours may interfere with the accuracy of the results, while the longer the period between death and the autopsy the less chance there is of cryoscopy affording reliable information.

Putrefaction leads by diffusion and imbibition processes to such a lowering of the freezing-point of the blood in cases of drowning, that even the Δ value of the normal blood may be exceeded.

This accounts for the fact that cryoscopy gives much better results in the majority of cases where the method can be employed in winter than in summer, when putrefaction as a rule commences early. Revenstorf attempted to overcome the above disadvantages by the cryoscopic examination of other body fluids, and more especially of the fluid in the lungs themselves. It is well known that in typical cases of death by drowning the lungs are more or less full of water, presenting a condition which has been called *œdema aquosum*, and to which great importance as a diagnostic sign of drowning has been attached. This condition is not always easily distinguished from the ordinary œdema of the lungs which may be present in certain other forms of death. By cryoscopy, however, Revenstorf shows that it is possible to distinguish the origin of the œdema, and, in seven cases out of twenty-one bodies recovered from the water, he was clearly able to prove the existence of an *œdema aquosum* as distinguished from a vital or ordinary œdema, and thus afford further evidence of death having occurred by drowning.

More recently Revenstorf has drawn attention to hæmolytic changes in the blood of those who have died by drowning, which, in certain circumstances, may afford a further means of diagnosis. The conclusions he arrives at in this connection are—"hæmolysis in the blood vessels, in cases of drowning, as distinguished from ordinary post-mortem hæmolysis, is characterised by the fact that the serum in the left heart shows a greater degree of hæmolysis than that of the right heart"; and further,

"absence of hæmolysis in the portal vein, together with the presence of hæmolysis in the heart's blood, is a certain sign that the immersion fluid was transfused into the heart after the stoppage of the circulation."

Finally, Revenstorf, in his interesting investigations on the subject of drowning, has accentuated the value of a microscopic examination of the air passages. By special methods of examination, he has shown that in many cases it is possible to demonstrate the presence of algæ and diatoms in the lungs of the drowned. The presence of such characteristic bodies in the minute air passages is the strongest presumptive evidence of drowning, that is, of these bodies having been inspired during life, provided of course that the same constituents are known to be present in the water in which the drowning took place. One great advantage of this last method of diagnosis is the fact that even in cases of advanced putrefaction it can afford positive results.—*Aerztl. Sach verstän. Ztg.*, 1905, Nos. 5 and 12; *München. med. Wchnschr.*, 1905, Nos. 11 and 12; *Vrtljschr. f. gerichtl. Med.*, Berlin, 1904, xxvii., p. 299.

Post-mortem Appearances in Hanging.

Lochte (*Vrtljschr. f. gerichtl. Med.*, Berlin, 1905, No. 2) has investigated the internal post-mortem appearances in eighty cases of hanging which came under his observation. As regards cyanosis of the face, which is stated by Hofmann and others to be generally associated with what may be called an atypical situation of the constricting ligature, as contrasted with the typical position, *i.e.* with the knot situated at the back of the neck, Lochte finds that cyanosis of the face depends much more upon the degree of compression which is exerted upon the large blood vessels than upon the symmetrical or asymmetrical situation of the ligature on the neck, leading to an inequality of compression on either side. In this connection also the nature of ligature, *i.e.* its capacity for producing direct compression of the vessels, has an important influence. Thus, narrow, firm ligatures, such as cord or rope, cause greater compression than broad bands, *e.g.*, a strap or soft materials, as a handkerchief or shawl. As regards the condition of the lungs, this is very variable. As a rule, if there has only been imperfect compression of the neck, œdema of the lungs is to be expected; in cases where there has been very firm compression, the lungs are found collapsed and rather anæmic than engorged; while in a third class of cases the lungs present no appearances which are characteristic one way or the other. The condition of the brain, the occurrence of petechial ecchymoses and of larger hæmorrhages, as also the occasional presence of food masses in the upper air passages, are discussed by Lochte in relation to their causation and interpretation; but for information upon these matters the paper must be consulted.

The conclusions which he arrives at may, however, be stated.

(1) The classification of the constriction mark into typical and atypical is of no consequence for the explanation of the internal post-mortem appearances. Of chief importance in this relation is the degree of compression which was exerted. (2) In considering the appearances present, it is chiefly necessary to keep in view the position in which the body was found, and the nature of the ligature. (3) The degree of

hyperæmia of the lungs depends upon the degree of compression exerted on the neck. (4) Cyanosis and greater or less œdema of the lungs are only to be expected in cases of incomplete constriction of the neck. In cases of complete constriction the lungs are collapsed and anæmic rather than engorged with blood. (5) Incomplete occlusion of the air passages is not infrequent in hanging, and may be presumed to have been present in all cases in which œdema of the lungs is found, and with certainty wherever aspiration of the stomach contents has occurred. (6) In the brain and lungs, as also in the mucous membrane of the alimentary canal, hæmorrhages may occur during death by hanging, the predisposing conditions being stasis of the blood and pathological changes in the walls of the blood vessels.

Poisoning by Wild Honey.

Aubin (*N. Zealand M. Journ.*, 1905, April 6) gives an account of the symptoms, causation, and treatment of poisoning by wild honey, cases of which appear to occur not infrequently in certain districts of New Zealand. The symptoms usually come on in less than an hour, and there are three principal modes of onset, which may be indicated by the terms—(1) Gastric, (2) nervous, (3) cerebral. In the first form giddiness and nausea are followed by vomiting, which is of a severe and persistent type. There is apparently no irritant action on the bowel. In the nervous form the symptoms are attributable to irritation of the peripheral nerves, indicated by tenderness of the muscles, pains of a burning character in the muscles of the arms, legs, back, and abdomen, and also numbness in these parts. In the cerebral type symptoms resulting from the direct action of toxic material on the brain are the first to show themselves. Thus the patient may drop down suddenly and become unconscious, convulsions occurring at intervals, or delirium may occasionally take the place of convulsions as the first symptom. As a rule, in severe cases all three types of symptoms are combined, one form, however, predominating. In New Zealand the most characteristic symptom of honey poisoning is the convulsive fit, which differs in no way from an ordinary epileptiform fit, and may be preceded by a cry.

As regards the causation of the toxic action, there appears to be some dubiety. According to Mr. Hopkins, the Government apiarist, the responsibility rests with the yellow flowers of a cress-like plant called "whauriki." In other countries a species of rhododendron has been suspected. Wild honey only is affected, especially that deposited in or near swamps. There is no instance, so far as the author is aware, of poisoning by cultivated honey. The treatment should be based on general principles—emetics, a dose of calomel followed by an enema, potassium bromide, and, if necessary, stimulants.

DERMATOLOGY.

UNDER THE CHARGE OF

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Abnormalities in connection with Lupus Erythematosus.

Bornemann of Frankfort relates (*Dermat. Ztschr. Berl.*, 1905, June) three cases illustrating special abnormalities associated with lupus erythematosus. The first was that of a strong man, æt. 42, with no tuberculous history or symptoms. His skin affection had commenced twenty years previously on the ears, after these had been crushed in an accident. On both were typical patches of the fixed and discoid variety, and on these areas papillomatous growths reaching the size of a cherry formed. Three repeated excisions seemed to eradicate the tendency to recur. The growths, on examination, proved to be mere papillomata, yet in the deepest part there was a suspicion of epitheliomatous proliferation. The second case was that of a tailoress, æt. 28, who had, since the age of 14, suffered from lupus erythematosus of the ears and scalp. On the right cheek was a small patch of lupus vulgaris, which appeared three years previously. There was slight dulness at the right apex with crepitations, but the sputum did not contain tuberculous bacilli. An injection of the old tuberculin caused rise of temperature, with distinct reaction in and around the patch on the cheek, but made no local change in those on the ears and scalp. Excision of the patch on the cheek was followed by trivial recurrence; cauterisation with Paquelin and pyrogallic acid effected little impression on the lupus erythematosus. The interest consists in the coincidence of the two diseases in a patient with apical catarrh, and of a probably tuberculous family, for her father died of pleurisy. Inoculation of pieces of tissue from the cheek into guinea-pigs and search for tuberculous bacilli in the sections were negative, but the microscopic appearances from specimens of the patch on the cheek were those of typical tubercle with giant cells, while similar sections from the ear were as characteristically lupus erythematosus. Whether in this case there was simply a concurrence of two diseases, or whether a closer relationship between them can be affirmed, there are no distinct data available. The third case was that of a female, age not stated, who suffered from a most extensive form of lupus erythematosus, which, commencing fifteen years previous to her death, on the nose and cheeks, in time involved almost the entire face, attacked the scalp, neck, arms, and nates, while on the chest and back an eruption clinically resembling lichen scrofulosorum, but which may have been a discrete variety of lupus erythematosus, manifested itself. On the face she had three attacks of erysipelas,—for streptococci were found on two occasions,—succeeded by persistent tumefaction and œdema. She was three times injected with the old tuberculin, but no reaction ensued, which rather militates against the tuberculous nature of lichen scrofulosorum, assuming that this diagnosis was correct. No treatment arrested the progress of the disease, which terminated by the

patient committing suicide during a febrile accession. At the sectio, appearances pointing to the occurrence of lupus erythematosus of the vagina were discovered. A form of pseudo-erysipelas in association with severe forms of lupus erythematosus has been described by Kaposi, and while in this instance the erysipelas was probably genuine, the œdema which persisted between the attacks was more likely that which not infrequently follows erysipelas of the face, and leads to the formation of doughy permanent swellings; particularly under the eyes, due to blocking of the lymph spaces. The type of disease approximated to that termed the exanthematic, always serious and usually fatal.

Dermatitis Seborrhoica and its Relations to Alopecia and other Conditions.

Bulkley (*Med. Rec.*, N. Y., 1905, May 13) defines dermatitis seborrhoica as a chronic, more or less inflammatory affection of the skin, probably of microbic origin, exhibiting various degrees of scaliness, generally of a greasy character, on normally coloured or moderately congested skin, with a tendency to extend (generally from the head downwards) by sharply defined, commonly circular areas. It is frequently accompanied with itching, which, however, is not as severe as in eczema. Most observers agree that the eruption is primarily one of the scalp, causing one of the forms of dandruff, where it may remain confined for years, and suddenly develop elsewhere, as a scaly eruption, or with more or less inflammatory symptoms. As to frequency, it occurred in about 10 per cent. of 8000 cases of cutaneous disease, as compared with 24 per cent. of eczema, and nearly $4\frac{1}{3}$ per cent. of psoriasis. It was found in nearly one half of the cases recorded as alopecia (excluding alopecia areata). It was if anything more common in females. Many observers hold that the disturbances in the epidermis and sebaceous glands are due to a microbe or microbes which as yet have not been absolutely identified. Enough has been learned to establish pretty clearly that in all its forms it is more or less contagious, that very much of modern baldness is caused thereby, though its development is favoured by the different elements which lower the vitality of the skin, and render it more susceptible to the operation of such local agencies as parasites. One of the most puzzling phases of the eruption is that in which it simulates psoriasis. Many a rebellious case diagnosed as psoriasis has yielded quickly to suitable treatment for dermatitis seborrhoica. In doubtful cases the canon of examining the entire surface should be rigorously observed, and it may be found that lesions in the axillæ or groins, or variations in the shape or scaling, are alien to the view that it is psoriasis. In treatment, most writers emphasise local medication, quite to the exclusion of general and internal, and it is true that the latter alone and unaided has relatively little direct influence on the eruption. There is no internal specific; arsenic has little or no influence. Yet it is unreasonable to suppose that the soil, or the vitality of the tissues, has nothing to do with the disease. As in tuberculosis, the micro-organisms certainly find their opportunity for activity in a suitable soil, so constant experience shows that dermatitis seborrhoica flourishes under certain deranged or depressed states of the system and

tissues. In innumerable instances he has heard patients declare that, with the advent of dyspepsia the eruption increases and the hair falls. Thus the results are more permanent when perfect general and local means are combined. On the scalp, lotions are far more agreeable and feasible than ointments, and, except in specially rebellious cases, the latter are not often required. The lotion he most frequently employs is this: ℞ Resorcin 1 to 2 drms., spt. vini rectif. 2 to 5 drms., glycerin 2 to 4 drms., aquæ rosæ ad 4 oz. The amounts of alcohol and glycerin may be varied according to the effect, in order not to cause the hair to be too sticky. This is to be applied with a medicine dropper, morning and night, so as to moisten the entire scalp, and then it should be well rubbed in with the tips of the fingers. Occasionally the head ought to be well shampooed with tincture of green soap, dried with heated towels, the lotion being well applied directly thereafter. Sometimes after the scaling belonging to the eruption is checked, the resorcin lotion, if too strong, will occasion a flaking of its own. This is no contra-indication, but the strength should be reduced. In some cases equal parts of chloral hydrate and resorcin act better than the resorcin alone. Formalin may also be added with advantage in rebellious cases. In the more dry, scaly conditions about the ears and face, it is often very satisfactory to use the lotion just advised for the scalp, to allow it to soak well in, and when dry to apply a trace of some soothing ointment, or one with from 3 to 6 per cent. of resorcin added to it.

Experimental Syphilis.

Metchnikoff (*Arch. gén. de méd.*, Paris, 1905, June 27) has made an important contribution to this subject. Though it would appear that, at a time when the disastrous late phenomena of syphilis were not recognised, healthy human beings have been inoculated, now such procedures are rightly debarred. For purposes of experiment, attention has been directed to members of the monkey tribe, as other animals do not respond. Of these the anthropoid apes alone seem to give anything like constant results. The chimpanzee can thus acquire not merely local but constitutional syphilis. The virus, to produce effects, must be introduced either into the skin of the eyebrows or the genital mucous membrane; if conveyed to the subcutaneous tissue nothing ensues. Incubation corresponds to that in man, a minimum of fifteen and a maximum of forty-nine days. As to the secondary lesions, roseola is indefinite, but solid and ulcerated papules occur; mucous patches are rare. On the ourang-outang the primary develop, but seldom, and then in mild form, the secondary. The lower apes, if they so contract syphilis, show a shorter period of incubation and a milder type. Young apes are much less sensitive than the adult or aged. As regards immunisation and the preparation of protective sera, nothing positive has been so far arrived at. The next point is the search for the organism of syphilis. Schaudinn and Hoffman have confirmed the presence of a spirochæta, the *Spirillum pallida*, in various syphilitic manifestations. This is an extremely pale spirillum, which may be advantageously studied alongside that of relapsing fever. This spirillum has been found by Metchnikoff in chimpanzees during the active period of the disease, but not when the

lesions have been recovered from. It has also been found abundantly present in hereditary syphilis. Levaditi has found quantities of the spirillum in a case of syphilitic pemphigus; he has observed the organism move as in relapsing fever. The spirillum of syphilis has not so far been isolated or cultivated, but there are other spirilla which have likewise not been cultivated. There are certain analogies between relapsing fever and syphilis. Relapsing fever is an ailment which runs its course in several weeks, recurring two or three times; syphilis is more protracted. There is enlargement of the spleen in both. No skin eruptions are present in relapsing fever, but in it, as in syphilis, irido-choroiditis has been met with at a late stage, probably due to the invasion of the spirochæta, for this has been known in apes to enter the eye. One may fairly conclude that syphilis is a chronic spirillosis produced by a spirochæta, pathogenic not merely for man, but for the apes of the Old World.

DISEASES OF CHILDREN.

UNDER THE CHARGE OF
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Etiology of Summer Diarrhœa in Infancy.

The following is a summary of the conclusions arrived at by Dunn (*Arch. Pediat.*, N. Y., 1905, June) in an exhaustive paper on this subject. The diarrhœal diseases of infancy occurring in the summer months differ in no way either clinically or anatomically from the diarrhœal diseases occurring in the cooler months, except in their much greater frequency. Classification on an anatomical basis, as, for example, into functional and organic, or non-inflammatory and ileo-colitis, is not convenient for etiologic study, owing to the variety of lesions found in cases of similar etiology and similar clinical course, and to the lack of correspondence between the anatomical and clinical picture. The author suggests the following clinical classification:—(1) *Acute nervous diarrhœa*, characterised by loose stools of normal colour and odour, without abnormal constituents. (2) *Irritative diarrhœa.*—Acute intestinal indigestion of the irritative type, characterised by the absence of persistent fever and by the presence of curds and undigested masses in the discharges. (3) *Fermental diarrhœa.*—Acute intestinal diarrhœa of the fermental type, characterised by the absence of fever and by green stools of a foul or sour odour. (4) *Infectious diarrhœa*, characterised by the existence and persistence of fever and by the tendency toward early signs of ileo-colitis, as shown by the presence of blood and excess of mucous in the discharges. When a specific organism is proved to be the cause, the case may be further particularised by the term infantile dysentery. (5) Rare cases occur corresponding to the known description of heat exhaustion and cholera infantum. Of the above types the irritative and fermental cases are by far the commonest.

The chief or primary cause of all the above types is the increased heat of the weather during the summer months, which probably acts in

the non-infectious cases by producing functional disturbance either of the nervous system or of the digestion: and which acts in the infectious cases by producing in the intestine conditions more favourable to the occurrence of infection.

Bacteria are the secondary cause of a certain number of cases being mainly, if not wholly, of the type classified clinically as infectious. Infection occurs by the introduction of bacteria from without, or by auto-infection with bacteria already within the intestine. The latter is probably the usual method.

The *Bacillus dysenteriæ* is a cause of most of the infectious cases. Whether it is the sole cause remains to be determined. The *B. dysenteriæ* can often be found in the intestine in cases where it probably has no causal relation with the pathologic process. Other organisms are probably a cause of some infectious cases.

Anatomical changes of various characters included under the term ileo-colitis may occur in any of the above clinical types except the acute nervous. Anatomical changes of some kind probably occur in all infectious cases.

Gonococcus Infections in Children, with Especial Reference to their Prevention in Institutions.

The conditions known as gonococcus ophthalmia, vaginitis, arthritis, or pyemia, are frequently overlooked, and are by no means limited to the children of the poor, but are often met with in those living under the best surroundings, and where the source of infection is difficult to trace. Vaginitis is the commonest clinical manifestation, and ophthalmia the rarest. The highly contagious character of gonococcus vaginitis makes it imperative that children suffering from it should not remain in the same wards or dormitories with other children. A similar danger, though less in degree, exists with gonococcus ophthalmia and acute gonococcus arthritis. It is probably impossible to prevent the spreading of the disease if infected children remain in the wards with others. They must either be excluded from the hospital, or, if admitted, immediately quarantined. Cases of gonococcus vaginitis can only be excluded from hospital wards by the systematic microscopic examination of smears from the vaginal secretion of every child admitted. If a purulent vaginal discharge is present, such examinations are imperative, and should be made as much a matter of hospital routine as the taking of throat cultures in children with tonsillar exudates. In the absence of microscopical examination, a purulent vaginal discharge in a young child may be assumed to be due to the gonococcus. The quarantine, to be effective, must extend to nurses and attendants, as well as to children. Furthermore, the napkins, bedding, and other clothing of infected children must be washed separately from that of the rest of the house. Where the gonococcus is found with no vaginal discharge, or with a very slight discharge, children should also be quarantined, although it is impossible at present to say to what degree such cases may be dangerous in a ward.

One of the greatest difficulties in connection with the gonococcus vaginitis arises, not from its severity, but from its intractability, and consequently the prolonged quarantine rendered necessary. The danger

to nurses from accidental infection, especially in the eyes, is considerable. At the present time, they are not sufficiently instructed in this respect.—Holt, *N. Y. Med. Journ.*, 1905, vol. i. p. 521.

Acute Pyelitis in Infancy.

This disease so frequently passes unrecognised on account of the absence of local symptoms, and is so apt to continue indefinitely unless specific treatment is employed, that attention cannot be too frequently called to the characteristic manifestations of the condition.

The etiology of most of these cases is very indefinite. The fact that a large proportion of the cases have occurred in female children makes it appear probable that the infection is often through the urethra, while the organism associated with most of the cases, the *Bacillus coli communis*, points to an infection originating from the alimentary tract, as does the fact that many of the cases follow intestinal disorders.

The clinical manifestations give no indication that the pelvis of the kidney is the source of the trouble. The usual symptoms are frequent subnormal stools, high temperature of irregular type, with marked remissions, and in some cases accompanied by chills. Consequently a diagnosis of gastro-intestinal disturbance is commonly made, and the urine is not examined, as pain in the region of the kidneys is seldom complained of. On this account many of the recorded cases have been allowed to progress for long periods before curative treatment has been employed. This is the more unfortunate, as curative treatment is very simple and effective, and always results in a comparatively rapid cure. The treatment consists in the administration of alkalies, in order to neutralise the condition of the urine, which is always found to be extremely acid in this condition. Freeman records a case in a male infant, aged 8 months, who was seized with vomiting and high fever. For twenty days medication was directed to the alleviation of gastro-intestinal symptoms, without benefit. On the twenty-third day the urine was examined, and found to be acid, with a specific gravity of 1010, to contain a large quantity of pus, and to have a few hyalin casts with a trace of albumin. Pure cultures of *B. coli communis* were obtained from it. Gradual recovery supervened under treatment by citrate of potash and urotropin.—*Arch. Pediat.*, N. Y., 1905, March.

Hypertrophy of the Pylorus in Infants.

Wachenheim (*Amer. Journ. Med. Sc.*, Phila., 1905, p. 636) discusses very fully in this paper the contentious theories which continue to rage concerning the cause of this condition. He considers that it may be due to either of the generally accepted theories regarding its causation. "One condition consisting of an overgrowth of the muscular and submucous coats of the pylorus narrowing the orifice of that viscus, and aggravated by a tonic contraction, which is in all probability due to the abnormal innervation that usually accompanies muscular hypertrophy," and "a second condition, a pyloric spasm pure and simple, associated with some slight secondary muscular hyperplasia." The prognosis of the former lesion is bad, of the latter fairly good. Clinically

there are two distinct affections whose symptoms are precisely alike, but whose anatomy, course, and prognosis differ widely. He considers that the rarity of the disease has been exaggerated, and that numerous cases have been overlooked. The diagnosis in many cases is not easy. The important symptoms are referred to, and a table of thirty-five published cases that came to autopsy, and another of thirty-two cases operated on, are given. The mortality recorded, and a description of the post-mortem findings, chiefly enormous hypertrophy of the muscular coats, is submitted.

The Treatment of Whooping-Cough.

Stepp (*Therap. Monatsh.*, 1904, November) claims that in fluoroform we have a drug of the utmost value in the treatment of whooping-cough. Fluoroform is a drug of the chlorine iodine bromine series, but is much more powerful in its action than any of the others. The solution generally employed contains 2 to 2½ per cent. fluoroform dissolved in water, and the dose is a teaspoonful every hour for babies, while older children may have up to a tablespoonful. Stepp illustrates the result of his treatment by a series of graphic curves, by means of which the number of paroxysms are shown from the commencement of treatment until the whoop has disappeared. He has treated twenty-two cases by this method, eleven of the cases being under a year old, and the remainder all under four years, and he has not lost a single case. The paroxysms diminished in force and number from the day of commencing treatment, and the duration of the characteristic cough was reduced to from six to eighteen days. The illustrative curves demonstrate a very rapid fall at the beginning of treatment, then more gradual and once again a much more rapid decline, and this fall of the curve is so regular in its course as to suggest some specific action of the drug. The author records at length many cases showing the result of his treatment. Thus, in one baby the number of attacks fell in three days from twenty-three to fifteen daily; in another infant of four weeks the attacks diminished from fifty-five to nineteen; and in still another from twenty-seven to three. Results such as these speak volumes for the efficacy of this drug, for even discounting the optimism of the writer in favour of his new remedy, any treatment that can show twenty-two consecutive recoveries in severe cases of whooping, mostly occurring in infants under a year, is certainly deserving of a very extended trial. The drug is tasteless, odourless, and apparently harmless, its only disadvantage being that it is somewhat expensive, the amount necessary for a course of three or four weeks being about thirty shillings. Sometimes it occasions some slight pharyngeal irritation on being swallowed.

ANALYTICAL REPORTS.

A "Clinical Blood Tube."

We have received from Dr. H. Watkins-Pitchford, Government Bacteriologist, Pietermaritzburg, a little instrument designed to carry samples of blood suitable for a subsequent enumeration of the red corpuscles. We have no hesitation in saying that it supplies a distinct want. As is well known, the Thoma-Zeiss pipette can only be used both accurately and expeditiously by a practised hand; it is a bad traveller, and is comparatively expensive. This instrument consists of a small glass tube and a capillary tube so arranged that when the larger tube is filled up to a mark, it contains one hundred times the fluid capacity of the capillary tube. To use the instrument, this tube is first filled with a suitable diluting fluid (normal saline solution serves the purpose). The capillary tube is now dipped into a drop of blood and fills itself. The end is wiped, and it is immersed in the diluting fluid in the larger tube, which is corked and shaken up. The larger tube now contains a sample of blood diluted a hundred times, which is readily transmissible, and which will remain suitable for examination for at least some days. The essential parts, together with spare capillary tubes and a needle, are all packed in a clinical thermometer case, and the cost of the whole is about threepence. The actual capacity of the capillary tube is equal to the bulk occupied by 99 mgrms. of mercury.

We can substantiate the inventor's claim that the difference between counts made from this tube and from the Thoma-Zeiss pipette is practically negligible. Not only its transmissibility, but the facility with which a large number of samples could be taken in experimental work, seems to promise general appreciation of the "clinical blood tube." We congratulate Dr. Watkins-Pitchford on the usefulness and (when one sees how it is done) on the simplicity of his invention.

Three Star Swiss Milk.

(Nettleton & Morris, London.)

By the Just-Hatmaker process for drying milk, which was introduced some two or three years ago, milk can be concentrated into a very convenient and portable form without chemically changing any of its constituents. At the same time the milk is completely sterilised. The manufacturers of the Three Star Dry Milk claim that, while preserving all the essential features above described, they have succeeded in overcoming an objection that was at first urged against dry milk, namely, that its flavour was spoilt by the process of manufacture, and the milk rendered so unpalatable as to be unfit for domestic use. We are pleased to be able to confirm this, as we find that, when prepared for use according to the directions, this powder yields a milk which has very

little, if any, of the "tinny" flavour commonly associated with such preparations. There are many circumstances under which fresh milk is not to be obtained, and an excellent substitute, such as this is, will, we feel sure, be welcomed by many.

Eudrenine.

(Parke, Davis, & Co.)

In performing operations under local anæsthesia produced by cocaine or eucaine, the main drawback has been that, in order to secure the requisite amount of anæsthesia, it has been found necessary to use these drugs in larger quantities than are compatible with safety. The result has been that not infrequently the patient shows symptoms of alarming collapse. To overcome this difficulty, the combination of adrenalin with cocaine or eucaine has of late been extensively resorted to. The adrenalin, by practically suspending the circulation in the part, localises the action of the anæsthetic by preventing its immediate absorption into the circulation. A much smaller quantity of cocaine or eucaine is required when used in this way, as weak a solution as 0·2 per cent. of cocaine producing, when combined with adrenalin, practically the same effect as 2 per cent. solution used without it. Eudrenine is a clear solution containing $\frac{1}{6}$ gr. of β eucaine hydrochloride and $\frac{1}{2000}$ gr. of adrenalin chloride in each c.c. (16·9 minims). For tooth extraction it can be used undiluted by injecting into the gum ten minutes before operation from 8 to 17 minims, according to the number of teeth to be extracted. For small surgical operations it may be also used undiluted, but when a large area requires to be anæsthetised, it may be diluted with four volumes of physiological salt solution. We have used eudrenine on several occasions with eminently satisfactory results, both as regards the anæsthetic effect and the complete absence of untoward symptoms.

Metakalin.

(The Bayer Co., London.)

Metakalin is a pure, readily soluble solid preparation of cresol. Its antiseptic principle consists only of metacresol, the most valuable of the three cresols which form the effective constituents of the many fluid disinfectants of this kind that have been introduced in recent years. For general surgical use a 1 per cent. solution is sufficient, and this is readily obtained by dissolving one tablet in 4 oz. of water, or, if a larger quantity of lotion is required, by dissolving the contents of one cartridge ($2\frac{1}{2}$ drms.) in 35 oz. of water. The solution is clear and has a soapy feel, suggestive of the well-known lysol. Metakalin has the advantage over fluid preparations, in that in its solid and handy form it is more portable, and a solution can be more accurately prepared. The convenient form in which it is issued by the firm will commend it to the medical profession, and the name of the firm should be sufficient guarantee that the preparation is one which can be thoroughly relied upon.

EDINBURGH
MEDICAL JOURNAL.

EDITORIAL.

Behring's Cure for Tuberculosis.

THE public mind must now have become so habituated to the proclamation by the lay press of fresh and certain cures for all mortal diseases as to receive each new-comer with a healthy scepticism, and we think that neither interviewing journalists nor their scientific victims need any longer be blamed on the score that their headlines still spur hosts of sufferers with hopes foredoomed to failure. Rather does it seem probable that the evil of newspaper puffs and announcements of therapeutic advances recoils on the discoverers by prejudicing the judgment of the medical profession—the final court of appeal—against their work. To take serious exception to the way in which the new remedy for consumption was heralded in the *Matin* were as superfluous as any diplomatic denial of the contemporary legend of the invasion of Schleswig-Holstein, which appeared in the same columns. A little more caution in dealing with Behring's conclusions seems appropriate—*voilà tout!* And, sooth to say, there is not very much to take hold of in it all. In so technical a matter, every step must be checked an hundredfold, every theory rigidly tested and tried; Behring's work has so far been uncontrolled, and to express any opinion on its probable value would at present be mere futility. Remains, then, but to give the gist of his communication as it appears in the French text. The cure of tuberculosis is to be attained by *cellular immunity*, which differs entirely from the humoral immunity conferred by an antitoxin, and is gained by the organism through its cells becoming impregnated with a substance called by Behring TC. TC exists in the bodies of tubercle bacilli; it has manifold properties, as implied in the general terms formative, fermentative, and assimilative; it is the "quasi-vital principle" of the bacilli. In the process of immunising cattle against tuberculosis, TC combines with the tissue cells, especially those of the lymphatic germinal centres; it is the cause of the reaction to tuberculin, as well as of the acquired protection against tuberculosis. Starting from the proposition that to introduce tubercle bacilli into the human body is inadmissible, the problem which Behring set to himself was to spare

the organism the labour of elaborating TC (and acquiring active immunity) by isolating TC *in vitro*, and employing it to confer passive immunity. In tubercle bacilli three groups of substances are distinguishable, of which two are highly toxic, one inert. After these have been extracted, the bacilli retain their shape and staining reaction, and are called *Rest-bacilli*. These contain TC, and can be converted into an amorphous substance, which, on inoculation, impregnates the lymphatic cells of the animal, the cells themselves becoming oxyphile in the process, while parallel with this metamorphosis immunity develops. These observations have so far been limited to animal experiment, and it only remains to add, in order to complete the description of TC, that it possesses the curious property of evoking tubercular granulations, which, however, never caseate or soften. This is the tenor of Behring's communication; the peroration appealing for a fair trial of the remedy was scarcely needed from him to whom the world owes antitoxin. Surely TC will not require, as that did, to wait four years for a Roux to test its curative action.

Sanatoria for Workers suffering from Tuberculosis.

We have received a request to call attention in our columns to a "Special Appeal Fund" to which an organisation calling itself a "National Committee for the Establishment of Sanatoria for Workers suffering from Tuberculosis" desires the charitable public to subscribe.

We have much pleasure in doing so, but at the same time claim the right to make certain observations.

We never heard of the committee before, but we are cordially in agreement with it as to the necessity of providing sanatoria within certain limitations, so that we trust the remarks which we feel constrained to make will not be attributed to a desire to detract from what, in many respects, is a most laudable object. In the first place, we are asked to recognise that it is an essentially national movement, established under the auspices of the Hospital Saturday Fund, and promoted by an exceptionally representative body, including delegates from practically all the great Friendly Societies and Trades Unions. We certainly recognise that the "National Committee" contains a great many illustrious names, well known wherever and whenever the cause of charity is pleaded, but this does not necessarily constitute the movement a national one. Indeed, we should have been much more ready to concede the national character of the movement had the appeal enumerated a long list of apparent nonentities, but whose descriptions would have indicated widespread interests and distant districts. No doubt it is stated that the co-operation of the great provident and friendly societies and other organisations has been

secured, but in our opinion these bodies do not represent the public, and their adherence has a special object, as we shall show.

In our opinion, far too much is being done by a certain class of society and its followers who have taken tuberculosis as their battle-cry in the cause of charity, and too little by the people themselves whom it is desired to assist. How many of those distinguished persons whose names appear on the Special Appeal Committee really know anything about the disease and its past and present history? We can quite understand anyone being moved to pity by the facts stated in the letter and documents sent to us, but these contain no facts in regard to the disease which have not been known for many years to all sanitarians and those who have taken any interest in the public health. It is not, we hold, by a few sensational figures and statements intended to harrow the feelings of the charitable that the great work of prevention should be promoted, but rather by appealing to the common sense of the individual, and more especially of those chiefly interested, for which purpose there are abundant more homely and direct illustrations.

The letter is sensational in its persuasive arguments, but also, we regret to say, unjust and inaccurate. We complain more especially of the paragraph, "Owing to the work of the poor law unions and a few consumption hospitals and the National Association for the Prevention of Consumption, in which His Majesty the King takes a deep personal interest, the death-rate from tuberculosis has been reduced during the last sixty years by no less than two-thirds, which means a saving of 75,000 lives a year."

Could anything be more unjust or show greater ignorance of the real facts than the above statement? We are quite certain that His Majesty knows a great deal more about the true history of sanitation and prevention of tuberculosis in the Victorian era than the author of the above sentence. All the brilliant work of Farr, Simon, Buchanan, and a host of others, all the unflagging energy of enlightened health authorities in our great towns and counties, their efforts to improve housing, cleansing, food, and the conditions of life generally, are as nothing compared to the work of poor law unions, a few consumption hospitals, and, of course, the National Association for the Prevention of Consumption. It is such statements, such gross ignorance, which make those who have any knowledge of the subject wonder whether "National movements" are in safe hands and are really serious attempts to grapple with a great problem.

Let us now, however, consider the object of the appeal. This is stated to be the sum of £50,000 to provide buildings and acquire a site for a first sanatorium for the accommodation of two hundred patients. A suitable site has been secured at Benenden, Kent. The Sanatorium will be self-supporting, and no appeal

for funds will ever be made to the public again. The Sanatorium will be self-supporting because the various societies and trades unions guarantee the cost of maintenance.

Now it seems to us that there are two chief objections to the present appeal. First, the Sanatorium can scarcely be national, since at most it can only supply the needs of London, according to the statistics given as to prevalence of tuberculosis in that city, if even that, while, being situated in Kent, it stands to reason that only the London district will be supplied by it. And yet "no appeal for funds will ever be made to the public again." Surely there must be some mistake; and it is intended to provide sanatoria in other districts of the country—if not, why "National movement"? If, on the other hand, our surmise is correct, surely each division of the country should provide its own funds and make its own effort, and under such circumstances this appeal to the general public of the United Kingdom is ill-advised. But should the initiative in the provision of such sanatoria for workers be taken by the general public at all? Should not the friendly societies, who will be the direct gainers by them, since each day's sickness of a member means a money loss? Should not the workers themselves, through their trades unions, make provision for their members who are sick? It is stated that friendly societies cannot use their funds for the purpose without legislation, but surely legislation for such a laudable and sound economic purpose would not be hard to obtain. It is possible also that the rules of trades unions may not permit the allocation of funds for the purpose, but we know that their funds are used to maintain workers on strike for months, and this difficulty, if it exists, and the will is present, should not prove insurmountable. In Germany insurance companies have found it pay to erect sanatoria for their clients, and the system is so successful that it is being extended. Why should not our working-class insurance companies, friendly societies, and trades unions do the same? At least let them make an attempt in this direction to help themselves, and leave the charitable public to devote their first energies and money towards helping those who have no such insurance organisations behind them, and who are less able to help themselves. We are heartily in sympathy with the movement for the provision of sanatoria as a means of preventing the spread of tuberculosis by helping sufferers to overcome the disease, and by educating them how to live with benefit to themselves and without endangering their neighbours. But sanatoria alone are not going to stamp out tuberculosis, as the appeal would almost lead us to believe. The brunt of the battle is being borne by a band of workers throughout the country who are content to pursue their labours in attacking the real causes of the disease unobtrusively and without publicly proclaiming it as a national movement.

We yield to no one in our admiration for the sympathy, time, and money which are given to charitable objects by the aristocracy and monied classes of the kingdom, but we fear they are not always wisely advised, and that sometimes fashion influences the direction of their sympathies rather than fact and judgment.

Suicide and the Press.

AMONGST the many sociological problems which have arisen in conjunction with a more highly developed civilisation and more widely spread education, none is of greater interest and importance than the enormous increase which is taking place in the number of suicides.

This increase is not confined to one continent or to a few nations, but is general throughout the whole of the civilised world. As regards Great Britain, the fact has frequently been alluded to in scientific publications and statistics, which prove that, although we formerly enjoyed an enviable distinction as compared with most continental countries, yet during later years our suicide rate has increased in an alarming manner. In the United States a recent publication discloses an equally serious aspect of the question. In 1891 it is stated that statistics showed that 3531 persons had committed suicide, whereas in 1903 the number of suicides had increased to about 8600, and during the last thirteen years the number reached the appalling total of 77,617.

It is not our object to attempt to discuss the causes accountable for this alarming indication of social degeneracy. We merely desire to call attention to one feature of modern life to which we cannot help attributing some blame for the increased prevalence of *felo de se*. We allude to the prominence given to such cases in the less reputable sections of the daily press.

It is well known and a generally accepted fact, that suggestion and imitation play no inconsiderable part in suicide, both in influencing the minds of certain members of the community to commit the deed, as well as in guiding them to the choice of place and means of fulfilling their purpose.

There are many mentally unstable individuals whose imaginations are fired by reading the account of some suicide served up in the newspapers in a sensational and often inaccurate manner in order to pander to the morbid curiosity of the public. Quite recently we saw, with feelings of disgust, on the posters of an evening paper, as the chief item of news for an intelligent public, the announcement in large letters of a "tragic" suicide. And what did it all come to? merely that a poor wretched man who had been given to drink had been found hanging in his workshop. It is, we hold, an insult to the intelligence and morality of the people for a journal to flaunt such wretched "news" before the inhabitants of any self-respecting community. But such unsavoury journalism has an even greater reason to be discouraged,

inasmuch as it undoubtedly exercises a baneful influence upon the minds of many who have contemplated suicide—and there are many such, thanks to the strenuousness of modern life—as well as upon others to whom the idea is thus for the first time suggested, not infrequently to take root with disastrous results.

We appeal to the press, which is such a power for good, and deservedly stands so high in the estimation of the country, to discourage sensational allusion to what is becoming so great a social disgrace, and to a subject which at best cannot be regarded as edifying, or likely to exercise any influence other than a detrimental one upon the public.

Commerce and Culture.

MR. G. K. CHESTERTON cannot imagine why the "silly season" is so called, for he declares that it is the only season when one has time to think wisely. We imagine, however, that those whose thoughts travel on such sane lines leave their opinions unexpressed, and it is only the "anxious parent" and the "old contributor" who deluge the public prints with their views on all matters, from crinolines to spooks, and from esoteric metaphysics to subdued eroticism. The "Anxious Parent" indeed is evergreen and ever anxious, despite the soothing syrups of experience and advice. We have met him under at least a hundred disguises this summer, but his latest outburst need only concern us here. He has turned up in the West as a correspondent of the *Glasgow Herald*, and is much concerned over that vexed question the Medical Preliminary. He evidently belongs to some similar category as does our strenuous Lord Provost, Sir Robert Cranston, who, in a speech delivered at the twenty-first aniversary banquet of the Students' Representative Council, made an appeal for the inclusion of the commercial element in university life. He bemoaned the stiff walls of entrance examination, the almost fordless moats of culture, the fierce drawbridges of learned competence. "Anxious Parent," on his part, is equally resentful of restrictions, but is more categorical. He names the object of his particular dislike. It appears that his son had been required to know the geographical situation of Navarino and Poona and a few other names not included in Bradshaw. Such a test of a young medico's culture he regards as astounding. "Leith I know, and Partick I know, but who are ye?" he may be heard soliloquising. Yes, indeed, it is a pity that the mere writer of prescriptions should be compelled to know as much as the average journalist! Besides, has he not his geographical dictionary? In fact, why know anything when cribs are so cheap? "Anxious Parent" appeals for the selection of examiners who shall give common-sense—that is to say, common-place—questions in geography. Charming idea, my poor distressed parent! What would you suggest? "Name the position of the chief golf-courses of Scotland? Where are Partick,

Portobello, Perth, and Pitkeathly? Tell us something about Coventry, Halifax, and Jericho? For what are the following places noted—Raeburn Place, The Priory Field, Blackheath, the Oval, and Ranelagh?" and so on. "Anxious Parent" is also concerned about etymology. His son has been asked the derivation of "psychology," "exodus," and "polygamy." Of course this is expecting too much. Let us deal with words in common use, for example, rot, stimey, lob, back-hander, penny-a-liner, and bath-bun. No, my dear Lord Provost, no, my esteemed Anxious Parent, the Universities are neither to be entered over the counter nor even by common-sense alone. They may be great unsympathetic machines, but they are shrines in which are preserved the genii of learning and culture. Monasteries and convents if you will, standing apart from the vulgar estimate of the Stock Exchange and the counting-house, preserving what is best of the early and middle ages with the precious fruits of latter-day culture. Their tomes are not ledgers nor handy encyclopædias. They grant no degrees to the smatterer or the scientific huckster. In the estimate of the shop and the Exchange they teach much that is worthless and irrevelant. True enough, but they conduct their alumni along the rivers of thought and in the by-paths of eternal truths. Gardens of the Hesperides, slopes of Parnassus, halls of Æsculapius if you will, but never mere people's palaces of fact or halls of the ready-reckoner and the penny encyclopædist. Lord Balfour of Burleigh put the matter squarely enough in his Edinburgh Rectorial Address:—"The Universities are really shrines, which the slow-working wisdom of the nation, and the long experience of centuries, have established to be the guiding lights of intellectual progress, and to be the centres of our highest intellectual endeavours. Every civilised nation has formed such shrines, bridging over the space between the discipline of the school and the battle-field which lies before you in active life on the other side of the stream."

The Chair of Midwifery. THE appointment of Sir John Halliday Croom to the Chair of Midwifery in the University of Edinburgh, rendered vacant by the resignation of Professor Simpson, ensures the carrying on of the traditions of a school in which the occupant of the Midwifery Chair has long enjoyed a great reputation and a pre-eminent position. In Edinburgh it has been customary to regard capacity for teaching as the chief, if not the essential, qualification for promotion to the Professorships in its University; Sir Halliday Croom is one of the most brilliant teachers Edinburgh has ever produced, and certainly one of whom any University might be proud to welcome within its halls. His professional record and position are too well known to

require mention in these columns, so we shall content ourselves by congratulating the new Professor on his well-deserved promotion, and the University of Edinburgh on having added to its Senate one well worthy to wear the mantle of the great men who have preceded him.

The Royal Victoria Hospital for Consumption.

NEXT month a remarkable effort will be made to improve the endowment of this great institution, by the holding of a Great International Fair in the Waverley Market, and perhaps there are some of our readers who will be grateful for the reminder of the fact. The success of such an enterprise can only be secured by individual interest and sympathy, and it is to be hoped that former members of the Edinburgh schools and—as this is a national concern—of other Scottish schools will not forget that to them, as well as to the general public, an especial appeal is made. It is not necessary to remind them of the importance of the cause. In itself it is eloquent of success and worthy of more than mere academic or detached interest. And let it not be imagined that the half-sovereign or the five shillings will be despised. This is not a mere "horse-leech" appeal. It is concerned with the wants of a great national institution, backed up by the unanimous approval of the scientific and lay public.

ORIGINAL COMMUNICATIONS.

SUPPURATION IN THE ACCESSORY SINUSES OF THE NOSE: A BACTERIOLOGICAL AND CLINICAL RESEARCH.[1]

By C. J. Lewis, D.Sc., M.D., F.R.C.P.Ed.; and A. Logan Turner, M.D., F.R.C.S.Ed., F.R.S.E.

The close anatomical relationship which exists between the nasal cavities and their accessory sinuses renders it necessary that an investigation into the inflammatory conditions of the latter should entail an acquaintance with the bacterial flora of the nasal chambers in health and disease. Further, the juxtaposition of the maxillary sinus with the buccal cavity makes it impossible to neglect the mouth as a possible path of infection. While a record of bacteriological research must always in itself prove of value, there can be no question that when the facts thus ascertained are associated with the observation of clinical phenomena, the combination enhances their value. In this research an endeavour has been made to bring together the bacteriological and clinical features of individual cases.

I. Bacteriology of Healthy Noses.

While our own observations have been mainly concerned with pathological conditions of the nose and its accessory sinuses, they have included also the bacteriology of the normal or healthy nose. The presence of micro-organisms in the healthy nose has been asserted by numerous observers, and denied by others. This difference of opinion has arisen probably from variations in the methods which the investigators adopted in the collection and examination of specimens of normal nasal secretion. Specimens taken with extreme care from the interior of normal nasal cavities are very frequently sterile, but specimens from the vestibule, from the hairs lining the orifices, or from the dried crusts, are seldom sterile, and generally swarm with micro-organisms.

Thomson and Hewlett[2] clearly pointed out this distinction between the vestibule and the proper mucous cavity. They concluded that the mucous membrane of the healthy nose only exceptionally shows any micro-organisms at all, and that the interior of the majority of normal nasal cavities is perfectly sterile. These observers examined mucus taken by platinum loop from various parts of the nasal cavity. The method of examination consisted in staining cover-glass preparations with

[1] From the Laboratory of the Royal College of Physicians of Edinburgh.
[2] *Trans. Roy. Med.-Chir. Soc.*, London, 1895, vol. lxxviii. p. 239.

gentian violet, or in making cultivations on agar, and incubating these at 35° C. for four to seven days. It is important to note the method adopted in relation to the results obtained, as with different methods the results are not identical. Of ninety-one films from the interior of the nose, seventy-two, *i.e.* 80 per cent., were sterile, and only two contained abundant organisms. Of seventy-six cultures from the interior of the nose, sixty-four, or 84 per cent., were sterile, and none of the remainder showed abundant growth. The vestibule was never found sterile. The characters of the organisms present in the films or cultures are not stated, but the authors suggest that the occurrence of pathogenic varieties is probably infrequent, and their presence exceptional.

Park and Wright,[1] on the other hand, described in 1898 experiments on the microbes of the nose in health, and came to conclusions quite the reverse of those quoted above. They agree with Klemperer that the interior of the healthy nose is not free from germs, and that the nasal secretion has no bactericidal action. They found only six cases sterile out of thirty-six specimens taken from mucus between the septum and the inferior turbinate, and as far back as possible. All the specimens were taken by loop, with the exception of one by swab. The same authors, in describing the species of organisms present in another series of ten healthy noses, found that *Staphylococcus pyogenes aureus, albus*, or *citreus*, was the most abundant of the various forms of bacteria present. Amongst other varieties mentioned are the *Micrococcus cereus flavus*, and *Micrococcus flavus desidens, Bacillus lactis aerogenes, Penicillium glaucum*, and *Micrococcus tetragenus.*

Hasslauer[2] in 1902 recorded the results of his examination of 186 specimens from the interior of 111 normal nasal cavities. The specimens were derived both from nasal contents and from the surface of the nasal mucous membrane. In his table of results there is no distinction, however, between the specimens obtained from the two sources. A sterile platinum wire was used to obtain the specimen from the septum or inferior turbinated body. He states that the *Staphylococcus pyogenes albus* was present in 25 per cent. of these specimens, the pneumococcus in 20 per cent., the *Streptococcus pyogenes* in 17 per cent., and the pseudo-diphtheria bacillus in 13 per cent. These four groups are the most common denizens of the healthy nose, and the cultures obtained are generally impure, though there are not often more than three or four kinds of bacteria present. Most commonly one of these predominates, and the order of predominance places

[1] *Ann. d. mal. de l'oreille, du larynx*, etc., Paris, 1898, November and February; *Journ. Laryngol.*, London, 1898, vol. xiii. p. 247; *New York Med. Journ.* 1898, February 5.

[2] *Centralbl. f. Bakteriol. u. Parasitenk.*, Jena, 1902, Bd. xxxiii. s. 47–51.

these organisms in much the same relative position as the order of frequency given above.

Amongst other observers, too numerous to quote in detail, may be mentioned Viollet,[1] who found staphylococci, streptococci, and pneumococci in normal nasal secretion; and Paulsen,[2] who found a pathogenic streptococcus present in one specimen out of twenty-seven examples of nasal mucus. Straus[3] found the tubercle bacillus in the nasal cavities of healthy persons, and demonstrated its presence by injection into guinea-pigs. The persons examined were all connected with hospital life, and the contents of the vestibule, as well as mucus from the interior of the nasal cavities, were used in the experiments.

Von Besser[4] examined eighty-one cases, and found the pneumococcus in fourteen of them, the *Staphylococcus pyogenes aureus* in the same number, the *Streptococcus pyogenes* in seven, and Friedländer's bacillus in two cases.

From the foregoing references to the results of these workers, it is evident that some difference of opinion exists regarding the presence or absence of micro-organisms in the healthy nasal chambers. For this reason, therefore, we have thought it necessary to make some further experiments upon this point.

Experimental work.—We have examined the healthy noses of sixteen persons, and in several of these both sides of the nose have been investigated. Specimens of nasal secretion were obtained from various areas in the nasal chamber either (1) by means of a sterile platinum loop through a sterile speculum, or (2) by means of a sterile swab. The method of investigation consisted in the staining and examination of direct cover-glass preparations, in cultivations upon solid media, such as agar and serum agar, and in inoculation of 1 per cent. peptone broth. The inoculation of the latter was accomplished either direct with the platinum loop or by immersion of the swab in the broth. The broth was incubated at 37° C. for eighteen to twenty-four hours, or sometimes forty-eight hours, and plate preparations were then made from it. In this way the organisms present were isolated and identified. There were twenty-six specimens from sixteen persons; and only three of the specimens were sterile. In all the remaining cases bacteria were found. Of these specimens, thirteen from seven persons were mono-organismal, nine from seven persons showed two varieties of bacteria, while one specimen showed a combination of three varieties of bacteria. The pneumococcus was present in four, staphylococci in thirteen, and streptococci in six specimens. The diphtheria and pseudo-diphtheria bacilli were not encountered, but the bacillus of Hofmann was found in two

[1] "Thèse," Paris, 1899, p. 50.
[2] *Centralbl. f. Bakteriol. u. Parasitenk.*, Jena, 1890, Bd. viii. s. 344.
[3] *Arch. de méd. expér. et d'anat. path.*, Paris, 1894, tome vi. p. 633.
[4] *Beitr. z. path. Anat. u. z. allg. Path.*, Jena, 1889, Bd. vi. s. 331.

specimens. Other organisms, isolated in these specimens from healthy noses, included *B. aureus* (twice), *B. mesentericus* (twice), spirillum (twice), bacillus of Friedlander (once), and *Proteus vulgaris* (once). The predominant staphylococcus was *Staphylococcus albus*, which occurred in eight specimens from seven persons, usually alone, but sometimes associated with other organisms. The *Staphylococcus albus* includes both the liquefying *S. pyogenes albus* and the non-liquefying *S. cereus albus*, and each of these was present in four specimens. In one specimen the only organism present was a bacillus which we were unable to name. It possessed the following cultural characters. *In broth at* 37° *C.* there was no apparent growth in twenty-four hours, but in forty-eight hours slight cloudiness was produced. The organism was a short, motile bacillus resembling *B. coli*, and did not retain the stain by Gram's method. *On agar at* 37° *C.* the streak culture simulated that of *B. typhosus*, and was not so gross as that of *B. coli*. *In milk at* 37° *C.* there was no coagulation within a fortnight, but the milk was rendered acid. *In taurocholate broth at* 40° *C.* neither gas nor acid was produced, but there was some growth. *In stab jelly at* 20° *C.* the organism grew along the stab as a colourless sheath growth with little surface extension. Liquefaction began in six days, and proceeded slowly. The liquefied portion was very mucoid and tenacious.

Pathogenicity.—Organisms derived from nine healthy noses proved on inoculation to be non-pathogenic to animals. From two healthy noses pathogenic organisms were obtained. In one of these the virulent organisms were the *Staphylococcus aureus* and *albus*, which produced local abscess in, but were not fatal to, guinea-pigs. In the other case, *Streptococcus pyogenes* was present, the broth culture proving fatal to a rabbit in fourteen days after intraperitoneal injection of 2 c.c. Our experiments, notwithstanding their limited number, enabled us to realise that the discordant results of the observers quoted above owe their discrepancy, partially at all events, to the difference in methods of examination adopted. For example, in some of our cases we could in direct stained films recognise no micro-organisms; further, in these same cases the agar cultures inoculated from the swabs showed no growth, and yet on immersion of the swab in sterile broth and on incubation of it for twenty-four hours, or occasionally forty-eight hours, growth took place. Had we trusted in these cases to the two former methods alone, and these were the procedures relied upon by Thomson and Hewlett, our sterile specimens would have numbered a dozen instead of only three. Incubation of the swab in broth at 37° C. for twenty-four hours was usually sufficient to show growth, although sometimes forty-eight hours were required before the broth showed growth to the naked eye. If there was no growth at the end of that time the broth remained sterile, even though incubated for long periods. It thus happens that the

interior of the normal nose may appear sterile, owing to the fact that organisms, though present, occur in such few numbers as to escape recognition by rapid methods. Further, it appears that the staphylococci found in the healthy nose are often of low vitality and do not grow so readily in ordinary media as the same varieties derived from pus. It happened more than once that broth in which a swab had been immersed and incubated for forty-eight hours showed no cloudiness or other sign of growth in the first twenty-four hours: on the second day, however, the broth either became cloudy throughout or remained clear but with distinct sedimentary growth. In the former case a staphylococcus, and in the latter a streptococcus, would usually be found on microscopical examination. Two days' incubation at 37° C. is not excessive for streptococcal cultures, but it is usual for a staphylococcus to show growth in one day. The inference is that the nose contained numerically few organisms, and that the inoculation was a very slight one, or that the organisms present in the nose were of diminished vigour, and were revived after a period in a suitable medium such as broth.

It appears that the organisms of the healthy nose belong to the same varieties as those found in abnormal conditions, but that they differ from the flora of pathological nasal membranes in actual numbers, in purity of culture, in vigour of growth, and in pathogenicity.

II. Bacteriology of Inflammatory Conditions of the Nasal Cavities.

The nose exhibits a variety of micro-organisms according to the particular pathological state. The common pyogenic organisms, the staphylococci and streptococci, may be present in inflammatory conditions, whether acute or chronic. Other organisms which may be present are the pneumococcus, the *B. pneumoniæ* (Friedländer), the *B. influenzæ*, and the *Diplococcus intracellularis* (Weichselbaum). Besides these varieties, a large number of others may be recognised as present in individual cases of rhinitis, *e.g.*, the putrefactive bacteria, such as *proteus*, the *B. mesentericus*, the *B. subtilis*, the *B. coryzæ segmentosus* and moulds, are not uncommon in diseased noses. Another great group of cases, those of fibrinous rhinitis, are characterised specially by the diphtheroid bacilli, including the *B. diphtheriæ* (Klebs-Löffler) and the pseudo-diphtheria bacilli. In addition, the bacillus of Hofmann, which is usually non-pathogenic, may be present. The literature concerned with the bacteriology of various forms of rhinitis, and especially with that of fibrinous rhinitis, is very extensive and too profuse for detailed recapitulation. The majority of the papers bear upon the relation of the diphtheria bacillus to this form of rhinitis.

The organisms present in inflammatory conditions of the nasal cavities belong to very much the same varieties as those which may be found in the healthy cavities. But whereas in the healthy noses the bacteria are frequently in small numbers, in pure culture, of low vigour, and of little or no virulence, in the diseased nose the organisms are abundant, several varieties being commonly present at once, they grow with vigour in subcultures, and they are frequently pathogenic to animals. All the varieties present may not be pathogenic on injection into animals, but usually one variety is virulent in the early stages of the disease. As we shall show from our experiments, the pathogenicity is high at first and diminishes rapidly, so that an organism isolated in the first few days of a nasal catarrh and then very fatal to guinea-pigs, becomes later incapable of producing any pathogenic effect.

Hasslauer[1] in 1902 reported the bacteriological results of his research on seventy-eight pathological nasal cavities. He dealt with one hundred and fifty-three specimens derived from various nasal conditions, such as rhinitis (acute, chronic, hypertrophic, and atrophic), ozæna, and chronic nasal catarrh. Unfortunately, he has dealt with the results in the aggregate and for comparison with healthy noses, and has not discriminated between the varieties of organisms present in particular diseases. His results showed that both in healthy and in pathological conditions the same varieties of organisms are present, but that numerically they were more common in acute and chronic rhinitis than in a healthy state of the nose. This was especially the case with such organisms as the pneumococcus, the *Streptococcus pyogenes*, and the pseudo-diphtheria bacillus, which were common in such cases. The nasal catarrhs showed the same organisms as the normal nose, and it was not possible to assign any one organism as the cause of the catarrh. To produce nasal inflammation, not only is the presence of pathogenic varieties necessary, but these varieties must be virulent, or, if avirulent, must recover their virulence by the influence of other factors, such as debility, chills, or traumatism.

Experimental work.—We have examined thirteen specimens from nine cases of purulent nasal catarrh. In eight cases the condition was of recent origin, while the remaining case was one of long-standing post-nasal catarrh. The *Streptococcus pyogenes* was present in seven of the cases, including the long-standing case. Staphylococci were present in six of the cases, and it is interesting to observe that many different varieties were isolated, namely, *pyogenes aureus*, *albus*, and *citreus*, the *cereus albus*, and *cereus flavus*. In only one case was the pneumococcus found. While recognising the above as probable etiological factors, it is necessary to note the occurrence of pseudo-diphtheria bacillus once, the bacillus of Hofmann once, a coliform bacillus once, *proteus* once, streptothrix once, and the *B. mesentericus* in two cases.

[1] *Centralbl. f. Bakteriol. u. Parasitenk.*, Jena, 1902, Bd. xxxiii. s. 47–51.

Of the eight acute cases, pure cultures of staphylococci were obtained in two, and in the remaining six the streptococcus was the probable exciting cause. In the long-standing case a staphylococcus was associated with the streptococcus, but probably the latter was the etiological factor.

As regards pathogenicity, from three of the cases virulent pathogenic organisms were obtained, twice the *Streptococcus pyogenes* and once the *Staphylococcus pyogenes citreus*. The streptococci in these cases were so virulent as to prove fatal to guinea-pigs in twenty-four hours. Ten days later the streptococcus, isolated afresh from the discharge in one of these cases, proved non-pathogenic. In two of the cases all the organisms present were tested on animals and found non-pathogenic. In the other four cases the pathogenicity of the microbial elements was not tested. The *B. mesentericus*, the streptothrix, the *proteus*, and the pseudo-diphtheria bacillus proved on injection non-pathogenic to guinea-pigs.

III. Bacteriology of the Mouth.

The micro-organisms of the mouth are numerous and derived from many sources. Food, water, and air all contribute varieties which become temporary inhabitants of the mouth, and which include representatives of the moulds, the yeasts and the bacteria. These common organisms of the buccal cavity are somewhat outside the scope of this paper, and, with the exception of those capable of exciting dental disease, probably have no special connection with inflammation of the maxillary antrum, or of the other accessory sinuses. Yet the pathogenic bacteria of the mouth include many varieties which are found in suppuration of the antrum and other sinuses. Thus the *Streptococcus pyogenes*, the staphylococci (*aureus*, *albus*, and *citreus*), the pneumococcus, the *B. diphtheriæ*, and *B. pyocyaneus*, are all found at times in the mouth. Owing to the anatomical relationship between the teeth and the antrum of Highmore, it is not improbable that inflammation of the latter might take its origin from diseases of the former. In many cases, indeed, a dental origin is assigned as the cause of suppuration in the antrum, and it is therefore necessary to compare the bacteriological flora of sinus suppuration with that of dental caries.

In dental caries organisms may be present both upon the surface of the decaying dentine and in the deeper tissues of the tooth. In addition to the organisms specially associated with carious teeth, any of the denizens of the mouth may, of course, be found on the outer surfaces, if not in the deeper layers, of the carious matter. The process of caries appears to be preceded, as shown by Miller, by the action of acids upon the calcium constituents in the teeth. These acids are the product of bacterial

life, and produce decalcification as the first stage of caries. Later the decalcified chondrinogen is dissolved or digested by the same or other organisms. In the deep layers of dental caries the characteristic organisms appear to be streptococci (generally *Streptococcus brevis*), the *B. necrodentalis*, and *Staphylococcus albus* (Goadby[1]). All these organisms are capable of either anaerobic or aërobic growth, and all produce acid, and so may possibly cause decalcification. Amongst the digesters of the tooth cartilage are *B. furcus*, *B. mesentericus*, *proteus*, *B. subtilis*, *B. fluorescens*, and *B. pleciformis*. The superficial organisms in dental caries are mostly aërobic, and are much more numerous than those in the deeper layers. Common organisms of the mouth and of superficial caries are the *B. mesentericus* (*ruber*, *vulgatus*, or *fuscus*), *B. gangrenæ pulpæ* (possibly *B. mesentericus niger* or *fuscus*), *Streptococcus brevis*, staphylococci and sarcinæ. Another organism frequently present is *Cladothrix buccalis*. Many of our specimens of pus from the antrum having been obtained directly through the mouth, it is not surprising that we should have encountered certain of the buccal organisms in the swabs.

IV. Bacteriology of Healthy Sinuses.

The bacteriological investigation of the healthy accessory sinuses during life is practically impossible, and our knowledge of the subject is based upon the examination of these cavities after death. The work of Torne[2] must be quoted here, since he alone has published observations of this nature. In all, he examined thirty-six cadavera in which the maxillary and frontal sinuses were healthy. Twenty-two of these cases were examined within two and a half hours after death, and in all these the sinuses were found sterile. This is evidence that these sinuses are free from bacteria during life. Of the remaining fourteen cases examined from three to twenty-five hours after death, seven were still sterile and seven contained bacteria. This suggests that the entrance of organisms occurs some hours after death. Thus the maxillary and frontal sinuses were sterile in twenty-nine of the thirty-six cadavera examined within twenty-five hours after death.

V. Bacteriology of Inflammation of the Sinuses.

The bacteriology of sinus inflammation has been studied by several observers, amongst whom Weichselbaum, E. Fränkel, and Dmochowski are prominent. Torne and Pearce also have examined the sinuses after death. In addition we are able to supplement these by an account of our own research.

[1] "Mycology of the Mouth."
[2] *Centralbl. f. Bakteriol. u. Parasitenk.*, Jena, 1903, Bd. xxxiii. s. 250–255.

Post-mortem examinations.—Törne[1] examined sixteen cadavera, in which there was more or less change in the frontal and maxillary cavities, either as regards contents or mucous membrane. In these sixteen cadavera he examined twenty-six cavities as to their bacterial contents. Eleven cavities, examined within three hours after death, showed catarrhal changes, but nine of these were sterile; the other two cavities showed *Bacterium sputigenum* and *Micrococcus aureus.* Twelve cavities showed chronic purulent conditions, in which the organisms present included streptococci, *Micrococcus pyogenes aureus*, *Pseudo-catarrhalis tardi liquans*, spirilla, *B. vulgaris*, *B. coli*, *B. pneumonicum*, and *B. mellodorifer.* Three cavities in acute cases, examined one and a quarter hours after death, all showed *B. pneumoniæ*, and one in addition showed *Micrococcus aureus.*

Pearce[2] has made some interesting observations on the conditions of the antrum in diphtheria. In many cases inflammatory changes were found in the antral cavities, and the Klebs-Löffler bacillus was present in nearly all of them. Of four cases of diphtheria complicated with scarlet fever, the antra contained pus in three, and the organisms present were streptococci and staphylococci.

Kirkland and Stacy,[3] in 1902, reported upon the pathological and bacteriological conditions of the cranial sinuses in one hundred and two post-mortem examinations which were made. Of these cases, sixty-four might be regarded as due to infection by micro-organisms, and thirty-four of these showed some affection of one or more sinuses. The bacteriological analysis of these cases revealed the presence of pneumococci, diplococci, staphylococci, streptococci, *proteus*, tubercle bacilli, and of other bacilli not differentiated.

Examination of the inflamed sinuses during life.—Herzfeld and Hermann,[4] in 1895, described the bacteriology of ten cases of suppuration of the antrum. Streptococci were present in eight and staphylococci of various kinds in seven of the cases. Only one case is recorded as mono-organismal. The bacillus present in this case possessed the characters of the bacillus of Friedländer, or an organism resembling this. *Proteus* was present in two cases, and coliform bacilli in three cases. Various other bacilli not named are described in certain of the cases, but always associated with staphylococci or streptococci, or both. It is noteworthy that the pneumococcus is not mentioned.

Howard and Ingersoll,[5] in 1898, in a contribution to our knowledge of the etiology of inflammations of the accessory sinuses of the nose, came to the following conclusions. Acute and chronic

[1] *Centralbl. f. Bakteriol. u. Parasitenk.*, Jena, 1903, Bd. xxxiii. s. 250–255.
[2] *Journ. Boston Soc. Med. Sc.*, 1899, March.
[3] *Journ. Laryngol.*, London, 1902, vol. xvii. pp. 561, 566.
[4] *Arch. f. Laryngol. u. Rhinol.*, Berlin, 1895.
[5] *Am. Journ. Med. Sc.*, Phila., 1898, vol. cxv. p. 520.

inflammations of these sinuses are not caused by a single micro-organism, nor even by a single group of organisms. With a few exceptions, due to aspergilli and vermes, inflammation of these cavities is due to bacteria. The bacteria found are those commonly present in the buccal and nasal cavities—in the former in health, and in the latter occasionally in health and usually in disease. The organisms occurring in these inflammations are *Diplococcus lanceolatus*, pyogenic staphylococci and streptococci, bacilli of the group of Friedlander's bacillus (*B. mucosus capsulatus*), *B. diphtheriæ*, and *B. influenzæ*.

Stanculeanu and Baup,[1] in 1900, published a paper on the bacteriology of suppuration in the facial sinuses. Their conclusions were that, clinically and bacteriologically, there are two varieties of empyema of the facial sinuses—one with fœtid pus, due to several microbes (chiefly anaërobic) and following on dental affections, and the other of nasal origin, with pus not fœtid, and due to such organisms as the pneumococcus and *Streptococcus pyogenes*. Hence they contend that it is possible to trace the source of infection from the buccal or nasal cavities according to the character of the pus and the organisms which are present in it. The greater frequency of anaërobic organisms in the mouth, as compared with the nasal cavities, lends some support to the views held by these authors. Further, as to pathogenicity, they state that in cases of nasal origin the aërobes, and in cases of dental origin the anaërobes, are always found virulent on injection into animals.

Experimental work.—1. *Sources of Material.*—We have investigated the bacteriological condition of fifty-seven antral cavities which were the seat of suppuration, but which were uncomplicated by associated suppuration in any of the other sinuses. In addition, we have also examined the pus from one ethmoid sinus and from four frontal cavities. Further, we report upon a series of twelve cases in which inflammation of the antrum was complicated by a similar condition of the ethmoid and frontal sinuses, or of both. In seventeen instances nasal polypi were present, and accompanied disease of one or more sinuses.

The material consisted of swabs from the pus from the affected cavity. The collection of the specimens for examination was undertaken by one of us (A. L. T.), and by Dr. Brown Kelly, of Glasgow, to whom we are deeply indebted for twenty-two swabs, collected from twenty cases.

The sources of material were varied as to locality, social condition, occupation, severity of disease, and other factors. The bacteriological examination of the swabs was conducted by one of us (C. J. L.).

2. *Methods.*—The scheme of investigation and the technique adopted have been as follows:—Sterile swabs of suitable size and in sterile tubes were provided. The swab, having been used and

[1] *Arch. d. sc. med.*, 1900, p. 121.

returned to its tube, was sent to the laboratory. Occasionally the swab arrived in too dry a condition to give a good direct film, or to cause growth when rubbed on a solid medium. As a rule, it it was still moist on arrival, and a film was then made on a clean cover-glass and stained for microscopic examination. The most useful stain was by Gram's method, and the film showed generally some pyogenic cocci which are Gram positive. Pneumococci, streptococci, and staphylococci might be recognised in the direct film, and indication thus given as to which organisms would likely grow on cultivation of the swab. The swab was then rubbed over the surface of solid media, such as blood serum and agar, the former in tube and the latter in tube or plate. These media were incubated at 37° C., and in twenty-four or forty-eight hours some colonies generally appeared. These were examined, and their identification and characters determined by microscopic examination, by staining, and by subcultures in other media. It speedily became evident, however, that this procedure did not give complete results; so, after the first few cases, the following method was substituted. Whenever possible, a direct film was stained as before. The swab was immersed in 1 per cent. peptone broth, and incubated in the broth at 37° C. for twenty-four to forty-eight hours. The broth at the end of this time nearly always contained more than one variety of organism, and was plated out so as to separate the different varieties. The plating out was conducted by one of two methods—(1) A fresh broth culture was inoculated from the original broth culture, incubated for one hour at 37° C., and used to inoculate a plate of jelly, agar, or serum agar. (2) The original broth culture was used, and several loopfuls of it were diluted in sterile distilled water, and the dilution used to inoculate a plate of jelly, agar, or serum agar. The inoculation of the plate might be done in the usual way with a wire dip of the one-hour broth culture, or of the dilution, so as to get both superficial and deep colonies; but more often the plate was spread with a platinum spreader, so as to get only superficial colonies, which are more easily examined. This latter method was used most freely, and gave satisfactory results. The best material for the plate is serum-agar, or agar spread with either blood serum or sterile blood. In making a serum-agar plate the agar was melted and allowed to cool to about 48° C. To it was then added sterile hydrocele fluid in the proportion of about 10 per cent. The mixed serum and agar were then poured into a sterile Petri dish, and allowed to set before being spread with the culture. For the supply of sterile hydrocele fluid our thanks are due to Dr. W. T. Ritchie. It was occasionally necessary to repeat the plating process several times before one could be quite sure that no bacterial constituent of the specimen had been overlooked. This was especially the case where the organisms present in any specimen differed markedly in their rate of growth. The plates

were incubated at 37° C. if of agar or serum-agar, and at 24° C. if of jelly; but this latter material was not much used for the primary plates. The plates were examined after incubation for one to seven days, and subcultures on media of many kinds were made from the various colonies in the plate. Amongst the media most useful were stab jelly, milk, taurocholate broth, glucose broth, blood serum, blood agar, agar, potato, and broth.

The general characters of the organisms isolated were thus well defined. In addition, the colonies and subcultures were examined microscopically, and films were obtained. Many of these films were stained and permanently mounted. Finally, the pathogenicity of many of the organisms was tested by injection of the cultures into animals, such as the rabbit, guinea-pig, or mouse. In certain cases, the above method of investigation was supplemented by cultures under anaërobic conditions.

The method adopted has the advantage of being complete, and all the organisms present in any swab should be revealed by it. Certainly many organisms would have been overlooked if the swabs had not been incubated in broth. On the other hand, the fact that some micro-organisms grow much more rapidly than others in broth at 37° C. led to their disproportionate representation in the plates, especially if the plate was prepared after only twenty-four hours. The numerical preponderance in the plate, *e.g.* of staphylococci, did not necessarily mean that these organisms had been preponderant also in the pus. Bearing this in mind, and comparing the plate results with the appearance of the direct stained film and with the manifestations of pathogenicity in animals, one could generally form an opinion as to the organism or organisms mainly responsible for the suppuration. It is necessary to insist that ordinary agar is an insufficient medium for the investigation of these cases, as the pneumococcus is frequently present in the impure cultures, and does not grow well upon it. Blood agar, blood serum or serum agar must be used, or the pneumococcus, and possibly other organisms, may be overlooked in the impure cultures. To the disadvantage of the method it must be admitted that the labour entailed is very great.

3. *The Affected Sinuses.*—(*a*) Suppuration of the Antrum of Highmore: the other Sinuses not being involved.—Under this heading there were eighty specimens examined from fifty-seven cavities, with results as follows:—

Organisms found and relative frequency.—The organisms found were of numerous varieties, the most common form being the pneumococcus, the staphylococci, and the streptococci. After these, but less often, come the pseudo-diphtheria bacillus, *proteus*, the bacillus of Hofmann, the *B. mesentericus*, and the *B. aureus*. Other kinds occasionally found are aspergillus, *B. subtilis*, *B. coryzæ segmentosus*, *B. pyocyaneus*, *B. pneumoniæ* (Friedländer), *B. influenzæ*, *B. xerosis*, *B. perfringens*, coliform bacilli, sarcina,

torula, leptothrix, *B. buccalis maximus*, *B. dentalis viridans*, spirilla, and chromogenic air cocci.

Streptococci were found in forty-three of the fifty-seven cavities, or in 75·4 per cent. The pneumococcus was present in forty-two of the fifty-seven cavities, or in 74·1 per cent. Staphylococci occurred in forty of the fifty-seven cavities, or in 70·1 per cent. The true pathogenic *B. diphtheriæ* (Klebs-Löffler) was never encountered in the antrum, but pseudo-diphtheria bacilli were present in eight of the fifty-seven cavities, or in 14 per cent. These pseudo-diphtheria bacilli were non-pathogenic varieties of the same group of bacilli as the diphtheria bacillus. They all produced acid in 1 or 2 per cent. glucose broth. This sufficed to distinguish them from the bacillus of Hofmann. They did not stain by Neisser's method. *Proteus vulgaris* and the *B. mesentericus* were each present in six cavities, or in 10·5 per cent.; while the bacillus of Hofmann and the *B. aureus* were each present in five cavities, or in 8·7 per cent. *B. subtilis* was present in three cavities, or in 5·2 per cent. Organisms present in two cavities, or in 3·5 per cent., were *B. coryzæ segmentosus*, aspergillus, sarcina, and a pink chromogenic air coccus. The other organisms mentioned above were each present in only one cavity.

In the antral cases the swabs were taken either from the pus found in the middle meatus of the nose after posturing the patient, or direct from the cavity of the antrum during operation.

Swabs from the nasal chamber were obtained from forty-two and direct swabs from twenty-seven of the fifty-seven cavities.

The pneumococcus was present in twenty-nine of the forty-two cavities yielding nasal specimens, and in twenty-one of the twenty-seven cavities yielding direct swabs, or in 70 and 77 per cent. respectively. Staphylococci and streptococci are likewise more frequent in direct swabs than in swabs through the nose. Staphylococci were present in twenty-eight of the forty-two cavities and in twenty-one of the twenty-seven cavities, *i.e.* in 66·6 and 77·7 per cent. respectively. Streptococci were present in twenty-seven of the forty-two cavities and in twenty-one of the twenty-seven cavities, *i.e.* in 64·3 and 77·7 per cent. respectively. So that in the nasal swabs the staphylococci hold the second place after the pneumococci in frequency, while in direct swabs all three varieties are present in equal frequency. The pseudo-diphtheria bacilli were entirely absent from swabs taken direct from the antrum and only appeared in the nasal swabs, and the same may be said of the bacillus of Hofmann. On the other hand, the *B. pyocyaneus*, the *B. xerosis*, *B. perfringens*, leptothrix, *B. plexiformis*, and spirillum were only present each in one specimen direct from the antrum, while the *B. influenzæ*, *B. Friedländer*, *B. coli communis*, and *B. buccalis maximus* were only present in swabs taken through the nasal cavity.

Combinations of organisms.—While the above figures are true

of individual organisms, those cavities in which the cultures were not pure showed diverse combinations of organisms. Of the fifty-seven cavities there were only four in which the swab yielded an absolutely pure culture. In two of these the organism present was the *Streptococcus pyogenes*, and the other two contained the *Staphylococcus pyogenes aureus*, and the pneumococcus respectively. The two latter cases were undoubtedly of nasal origin, as indicated by their history.

The three main types of organisms being the pneumococci, the staphylococci, and the streptococci, and these far exceeding any other kinds in frequency of occurrence, it is possible to divide the cavities according to their relation to these types. Of the fifty-seven cavities, twenty-four showed the presence of these three types in combination. Twenty-one cavities contained two of these, namely, the pneumococcus and a staphylococcus associated in seven, the pneumococcus and a streptococcus in seven, and a staphylococcus and a streptococcus in seven cavities. Eleven cavities, inclusive of the four which yielded pure cultures, contained only one of these three types, in four cases the pneumococcus, in five cases a streptococcus, and in two cases a staphylococcus. In one cavity none of the three types were represented. In this latter case, *Proteus vulgaris*, the pseudo-diphtheria bacillus and the bacillus of Hofmann were present.

Comparison of organisms in recent and long-standing cases.—For the purpose of this classification, we regard as recent cases all those presenting themselves for treatment within a period of one year from the commencement of the disease. The long-standing cases include all which had lasted longer than this period, and their duration of discharge extended for varying periods from one year up to thirty years. The fifty-seven cavities were thus divided into thirteen recent and forty-four long-standing cases. Of the thirteen recent cases, eleven showed staphylococci, eleven showed pneumococci, and eight showed streptococci. Of the forty-four long-standing cases, thirty-one showed pneumococci, thirty-five showed streptococci, and twenty-nine showed staphylococci. It is notable that the streptococci are present in 80 per cent. of the long-standing types, and only in 61·6 per cent. of the recent cases; whereas the staphylococci reverse this proportion, and are present in 84·6 per cent. of the recent cases, and only in 66 per cent. of the long-standing cases. The pneumococcus is present in a somewhat similar proportion to the staphylococci, being present in 84·6 per cent. of the recent cases, and in 70 per cent. of the long-standing cases. Of the other varieties of bacteria, the analysis shows that proteus and the bacillus of Hofmann were only present in long-standing cases, but that the pseudo-diphtheria bacillus and the *B. mesentericus* were present in both recent and long-standing cases. The *B. influenzæ*, which was only obtained in one instance, occurred in a recent case of only three weeks' duration.

Comparison between swabs obtained from the nasal chambers and from the antral cavity direct in the same case.—From thirteen of the fifty-seven cavities swabs were obtained from the pus through the nose, and in the same cases a second swab was furnished direct from the cavity of the antrum during operation. A comparison of the organisms isolated from the two swabs occasionally revealed interesting results. It was not to be expected that in all cases the bacterial flora would be the same, owing to the possibility of the nose containing other organisms than, or in addition to, those concerned with the antral suppuration. Nevertheless, in three of the thirteen cavities the pus from each source contained exactly the same organisms. Again, in one cavity the direct specimen contained none of the organisms found in the nose, but was a pure culture of *B. pyocyaneus*. In four cavities the direct specimen showed the *Streptococcus pyogenes*, which had not been present in the nose swab. In two cavities the pneumococcus was present in the direct swab, and not in the nose swab. In the other three cavities the direct swab contained one or two, but not all, of the varieties already isolated from the nose swab. In one of these latter cases the direct swab contained the pneumococcus and the *Streptococcus pyogenes*, but not a staphylococcus, though all three varieties had been present in the nose. In the second case the direct swab showed the pneumococcus, while in the nose there were, in addition, a streptococcus and a staphylococcus. In the third case the direct swab yielded staphylococci and streptococci, but did not contain *Proteus vulgaris*, which had been recovered from the nose swab in addition to these organisms.

The organism or organisms regarded as predominant in individual cases.—Though in the wealth of organisms associated in these cases, and possibly pathogenic, it could not be certainly stated which was the *fons et origo mali*, yet in some of the cases we were enabled to conjecture which organism was most probably responsible. This we did on consideration (1) of the pathogenicity of the organisms (as ascertained by experiment on animals), and (2) of the organisms in direct swab as compared with nasal swab from the same case, and (3) of the persistence in chronic cases of particular varieties, and (4) of the occurrence in pure culture of one organism. In this way we are able, though with some diffidence, to assign the principal rôle to the pneumococcus in fourteen, to the *Streptococcus pyogenes* in nineteen, and to the staphylococcus in six of the fifty-seven cavities.

Analysing the recent cases, in the first instance, we find the pneumococcus probably responsible in four, staphylococci in three, and streptococci in two, while four remain undetermined. Of the long-standing cases, on the other hand, the pneumococcus may be assigned as the principal organism in ten cases, staphylococci in three, streptococci in seventeen, and fourteen cases are undetermined.

(*b*) Suppuration of the Antrum complicated by a Similar

CONDITION OF ONE OR MORE OF THE OTHER SINUSES.—*Nature and number of cases.*—We have examined fifteen specimens of the pus from twelve antral cavities, complicated in four cases by ethmoidal, in six cases by frontal, and in two cases by both ethmoidal and frontal suppuration. In six of the cases the pus was obtained from the nasal cavity, consequently it is not possible to state its exact source. In the remaining six the swab was obtained directly from the antral pus. Unfortunately we did not obtain pus from the associated sinuses in this latter group, so that no comparison could be made as to the organisms in the different cavities.

Organisms found and relative frequency.—Ten cavities showed staphylococci, seven showed streptococci, and seven pneumococci. Other organisms found were the pseudo-diphtheria bacilli and the bacillus of Hofmann each in three cases; *B. mesentericus* and *proteus* each in two cases; spirillum, cladothrix, and sarcina each in one case.

Combination of organisms.—Only one cavity showed a pure culture, and this was the *Staphylococcus aureus citreus*. Four cavities contained all three main types, namely, the pneumococcus, streptococci, and staphylococci. Four cavities contained two of the main types, staphylococci and streptococci in two cases, and the pneumococcus and staphylococci in two. In the other three cavities only one of the main types of organisms were represented, namely, the pneumococcus, *Streptococcus pyogenes*, and *Staphylococcus pyogenes albus* respectively in one each.

The organisms found in the pus taken from the nasal chambers in these cases in which more than one sinus was involved, resemble those derived directly from pus removed from an infected antrum.

(*c*) SUPPURATION IN THE ETHMOID SINUS ALONE.—Of this nature we had only one case, which had been of long standing. It showed *Streptococcus pyogenes* and *Staphylococcus pyogenes aureus*.

(*d*) SUPPURATION IN FRONTAL SINUS ALONE.—We have examined four frontal cavities which were the seat of suppuration. Two of these were from the same patient, and showed the pneumococcus and *Staphylococcus cereus flavus*. The case was a chronic one, and the organisms were not virulent. In a third cavity from another patient staphylococci and streptococci were present, together with *B. coli communis* and *B. aureus*. The last case showed the pneumococcus, the *Staphylococci aureus* and *albus*, and *Streptococcus brevis*.

(*e*) DENTAL CYST IN ANTRUM.—We had the opportunity of examining the clear fluid of a dental cyst which projected into the antrum. The specimens contained also a little blood. A somewhat rare streptococcus was present, the *Streptococcus hominis liquefaciens*, and a non-liquefying staphylococcus, the *Staphylococcus cereus flavus*.

Pathogenicity.—The pathogenicity of many of the organisms, isolated from the sinuses, was tested on animals. The animals used were rabbits and guinea-pigs. The methods of procedure consisted in obtaining pure cultures in 1 per cent. peptone broth,

and in injecting subcutaneously or within the peritoneal cavity two or more c.c. of these cultures. The pathogenicity of the organisms was demonstrated by local abscess or by general illness, which might be fatal. Where neither a fatal result nor a local abscess occurred, the animals generally remained in good health, but sometimes became out of condition, though not acutely ill; such a condition was followed by complete recovery in the course of a week or two. A large number of injections were followed by no symptoms, and the organisms were either absolutely non-pathogenic or had lost any virulence they may have possessed in the early stages of the diseases with which they were connected. In order to ascertain whether the combinations of organisms present might be pathogenic, even though the individual organisms in pure culture were not so, several injections of impure cultures were made. The results yielded no evidence that organisms which in pure culture were non-pathogenic, would in combination give rise to disease. The reverse was, however, not the case, for in three instances a pneumococcus which in pure culture was pathogenic, produced no illness when injected along with the other organisms present in the same case.

Considering first the cases of pure antral disease, there was found a very marked difference in the pathogenicity of organisms derived respectively from recent and long-standing cases.

From the thirteen cases of antral disease which had lasted less than twelve months, thirty-three cultures were tested as to pathogenicity, and sixteen were found pathogenic, *i.e.* a percentage of 48. The percentage pathogenicity of the different varieties of organisms was as follows:—Pneumococci were present in eleven cases, were tested in ten, and found pathogenic to rabbits in five, or a pathogenicity of 50 per cent. Staphylococci were present in eleven cases, were tested in ten, and found pathogenic to guinea-pigs in five, or a pathogenicity of 50 per cent. Streptococci were present in eight cases, tested in all, and found pathogenic in six, or a pathogenicity of 75 per cent. In one case the non-pathogenic streptococcus was a rare form, the *Streptococcus hominis liquefaciens.*

The other organisms from these cases which were tested in this way were found non-pathogenic; these were the *B. pseudo-diphtheriæ*, *B. aureus*, *B. buccalis maximus*, *B. influenzæ*, *B. mesentericus*, and *B. dentalis viridans.*

From the forty-four cases of chronic antral disease which had lasted more than one year, and often for many years, eighty-eight cultures were tested as to pathogenicity, and nineteen were found pathogenic, *i.e.* a percentage of 22. The percentage pathogenicity of the different varieties of organisms was as follows:—Pneumococci were present in thirty-one cases, tested in seventeen, and found pathogenic to rabbits in five, or a pathogenicity of 29 per cent. Staphylococci were present in twenty-nine cases, tested in twenty-one, and found pathogenic in five, or a pathogenicity of

20 per cent. Streptococci were present in thirty-five cases, tested in twenty-eight, and found pathogenic in nine, a pathogenicity of 32 per cent. In one case, *Proteus vulgaris*, when isolated, was found pathogenic to the guinea-pig.

Comparison has been made between the duration of the inflammation in chronic antral cases and the pathogenicity of the organisms present. When subdivided in this way the numbers become rather small for accurate deduction, but the comparison served to show that in certain cases long chronicity of the condition was not incompatible with the retention of a certain amount of virulence. For example, in four cases in which the condition had lasted more than eight years, streptococci were found pathogenic to animals, but in none of these cases were the results fatal, the pathogenicity showing itself as a local abscess or in slight illness, from which the animals recovered. In one case which had lasted longer than eight years, the pneumococcus was sufficiently virulent to kill a young rabbit, but in other cases of similar duration it did not do so.

The most notable feature of the pathogenicity of the organisms present in antral cases is the fact that in recent cases the organisms are pathogenic twice as often as in chronic cases; further, that in both recent and chronic cases the streptococci are more pathogenic to animals than are the other varieties commonly present. The streptococci are almost always pathogenic when recovered from recent cases, but in chronic cases seem to have largely lost their virulent characters. There is no guarantee, however, that these organisms would remain so little virulent if by chance implanted on more suitable soil. Their virulence might possibly be restored under suitable conditions. Pneumococci and staphylococci also are less virulent in chronic than in recent cases.

Taking all the sinus cases together, including the antrum, the pathogenicity in chronic cases is 21 per cent., because of one hundred cultures tested twenty-one were pathogenic. All the recent sinus cases were examples of antral disease alone: hence their pathogenicity, as stated above, was 48 per cent. The pathogenicity of the organisms in cases of nasal catarrh has already been stated (p. 399).

THE BACTERIOLOGY REGARDED FROM A CLINICAL STANDPOINT.

Up to this point we have considered the subject purely from the bacteriological aspect. It is necessary now to endeavour to determine to what extent the various micro-organisms influence the course and the nature of the disease. Certain points of undoubted clinical interest present themselves from a study of the foregoing researches. Amongst these there is the question of the origin of *antral* suppuration, which has from time to time

occasioned considerable discussion. Opinions vary as to the relative frequency with which the antrum may become infected from the teeth or by way of the nasal cavity. We have consequently endeavoured to ascertain, from a study of the micro-organisms met with in the pus taken from the antrum, whether any additional light can be thrown on this vexed point.

Fifty-two patients suffering from uncomplicated antral suppuration were examined, the actual number of cavities investigated bacteriologically being fifty-seven, as the affection was bilateral in five cases. Twenty-nine were males, and twenty-three were females. In thirty-seven the age of the patient was ascertained, and this was found to range from 17 to 78 years. The greatest number occurred in the decade between 30 and 40 years of age. The duration of the discharge from the affected cavity varied from a few days to thirty years. As indicated earlier in the paper, we have classified the cases into recent and long-standing or chronic, according to the period of the affection. Thus in thirteen the purulent discharge had been present from a few days to seven months; consequently they have been designated as recent. In the remaining thirty-nine patients, in whom the discharge had persisted from one year to thirty years, the affection has been regarded as a long-standing one. We consider that this classification is a suitable one, being of the opinion that when a sinus discharges for one or more years the affection should be regarded as long-standing or chronic.

Etiology of Antral Suppuration.—In this connection it is interesting to note how often inquiry from the patient as to the possible cause of the suppuration proves very unsatisfactory. It may be impossible to obtain any accurate information as to the previous existence of an illness from which the onset of the symptoms might be dated. In those cases in which the nasal discharge has continued for a great many years, one can readily understand how difficult it is for a patient to assign a cause for his symptoms; but even in recent cases of a few weeks' duration, we may be quite unable to obtain the desired information. A possible explanation of this difficulty, in some instances at any rate, will be presently referred to.

An analysis of the clinical causes which have been assigned for the antral suppuration in our series of fifty-two cases, brings out the following points:—In twenty-seven no reason could be given by the patient. In ten cases the symptoms supervened upon an attack of influenza; in five the discharge followed an acute coryza, which was not regarded as of an influenzal nature; in one the condition was traumatic in origin. In nine cases there was distinct evidence of dental disease being the etiological factor. In other words, we may regard fifteen as being of nasal, and nine of dental origin.

In order to estimate on a larger scale the path of infection in

antral suppuration, we have added to the fifty-two cases bacteriologically examined, forty-eight others, occurring in the practice of one of us (A. L. T.), in order to bring under review in this connection one hundred cases. The latter were not bacteriologically examined. It is unnecessary for our purpose to examine the forty-eight *seriatim*; it will suffice to consider the hundred cases as a whole. Of these, forty-nine patients were unable to assign any reason for the onset of the nasal symptoms. Of the remaining fifty-one, in thirty, or 58 per cent., the path of infection could be traced to the nasal cavities, influenza being credited with sixteen, or 31 per cent., and an acute coryza, not of an influenzal nature, accounting for fourteen. Infection of the antrum probably arose in connection with the teeth in nineteen, that is, in 37 per cent. Two were traumatic in origin.

Clinical evidence goes to show that influenza unquestionably plays a prominent part in the etiology of sinus inflammation. The occurrence of suppuration in the accessory sinuses as an intercurrent affection in pneumonia has been raised by several writers, and more recently again by Brown Kelly.[1] This writer suggests that a more searching inquiry should be made as to the possible occurrence of an antecedent pneumonia in cases of sinus suppuration. Since the publication of Kelly's paper, we have inquired into this point, but up to the present time we have not obtained any positive evidence in connection with it.

It is apparent from the figures quoted above, that the nasal cavities play the more important part as a pathway of infection in antral suppuration. A study of the bacteriology of these cases will, we think, establish this more conclusively. There is a question, however, which naturally suggests itself in considering the mode of infection as exemplified in the above hundred cases. Are we to regard the teeth as the probable source of the antral mischief in the forty-nine patients who were unable to give any information regarding the onset of their symptoms? Are all these cases of dental origin in which the onset escapes the notice of the patient? If this view were to be accepted, the percentage of dental cases would be enormously increased, and would greatly exceed those of nasal origin. We are not prepared to accept this explanation, as we do not find reasonable grounds for doing so.

Where the clinician fails to obtain a definite statement from his patient regarding the onset of the nasal discharge, he is apt to conclude that the affection must have arisen in connection with a diseased tooth. We have taken special care in our cases not to regard caries of the teeth as a causative factor without obtaining very definite clinical evidence of the same. As Hajek has pointed out, many observers are not sufficiently critical: because an upper molar or premolar tooth is carious or has been previously extracted, it does not of necessity follow that the source of the sinus

[1] *Glasgow Med. Journ.*, 1904, November.

mischief must have existed in connection with one or more diseased teeth. A history of previous tooth trouble can hardly suffice to establish an etiological connection between the diseased tooth and the maxillary suppuration, especially when we consider how very frequently the teeth in the upper jaws are carious without any antral suppuration ever being present. Opinions are very various regarding the part played by the teeth and the nasal passages in the production of maxillary sinus suppuration. There would appear to be, however, a growing tendency to regard the latter route as the more frequent pathway of infection. Grünwald, in ninety-eight cases of antral disease, found no connection with the teeth in fifty-nine, because in all these cases the teeth were perfectly sound. His experience in connection with such a large proportion of healthy teeth is certainly exceptional, but it affords a strong argument in favour of the nasal origin of antral disease. In the hundred cases in our series, there were only three patients possessing a perfectly sound set of teeth. In the remainder, either carious teeth were present, or there was a history of extraction or other dental treatment. Jeanty found in connection with twenty-two cases of antral suppuration, carious teeth in twenty-one of them, but he considered that in no case were the teeth the causative factors. Tilley states that in three hundred cases of antral abscess observed by himself, he had only met with one patient in whom the teeth were quite healthy. Hajek could only obtain proof of the dental origin of antral inflammation in thirteen out of nearly two hundred cases observed by himself, but adds that in many other cases evidence of such origin might have been produced. Richards,[1] in a recent paper, has tabulated thirty cases of suppuration in the antrum, in which sixteen, or fifty-three per cent., were of undoubted nasal origin, while six were certainly, and three were possibly, due to carious teeth. Lermoyez, on the other hand, and B. Fränkel, amongst others, are of opinion that the path of infection is to be found more frequently in connection with the teeth.

From the few quotations thus made, it is evident that considerable diversity of opinion is entertained upon this point.

That the antrum may be infected both by way of the nose and from the teeth, there can be no doubt. The mere fact that it is the most frequently affected of all the sinuses, and so often, too, without any of the other cavities being involved, is strong evidence in favour of the twofold route of infection. Further, we cannot ignore the fact that for the successful treatment of such cases it is essential that due regard should be paid to the condition of the teeth, and that the necessary steps be taken to deal with them.

Bacteriological evidence bearing on etiology. — In order to arrive at some conclusion with regard to the source of the organisms found in cases of antral suppuration, it is necessary to study the bacterial flora of the adjacent cavities from which the

[1] *Internat. Dent. Journ.*, N.Y. and Phila., 1905, February.

infection may pass. Examination, in the first instance, of the *healthy* nasal cavities, demonstrates the fact that a variety of micro-organisms may be present in them, notwithstanding that some difference of opinion has been expressed upon this point. Of these, the *Staphylococcus pyogenes albus*, the pneumococcus, and the *Streptococcus pyogenes* are the most common, while the pseudo-diphtheria bacillus, the bacillus of Hofmann, the pneumo-bacillus of Friedlander, and others have been isolated. The relative predominance of the organisms is found to exist in the order given on p. 395. In acute and chronic *inflammatory* conditions of the nasal chambers, we have shown that the same organisms are present. The common pyogenic organisms, the staphylococci and streptococci, are met with, while less frequently the pneumococcus, the *B. pneumoniæ* (Friedländer), and the *B. influenzæ* are also found. Putrefactive bacteria also occur, *e.g. proteus, B. mesentericus,* and *B. subtilis.*

Within the *buccal* cavity, pyogenic and pathogenic organisms are found in considerable numbers even in mouths which may be justly regarded as healthy. Amongst these may be mentioned the pneumococcus, the diphtheria bacillus, the *Streptococcus pyogenes*, the *Streptococcus brevis*, *B. coli communis*, *B. pyocyaneus*, the *Staphylococcus albus, aureus,* and *citreus.*

Amongst the bacteria of *dental caries* we find the *Staphylococcus albus* and *aureus*, the *Streptococcus brevis*, the *B. necrodentalis*, the *B. subtilis*, *B. mesentericus*, *B. plexiformis*, and the *B. dentalis viridans*. In order to save a needless repetition of the micro-organisms met with in purulent affections of the antrum, the reader is referred to pp. 404–407.

It is quite evident from the foregoing, that while there are certain organisms which may be regarded as peculiar to dental caries, *e.g.* the *B. necrodentalis*, *B. dentalis viridans*, and the *B. plexiformis*, there are a number which are common alike to the nasal and buccal chambers, and are met with both in healthy and diseased conditions. The presence of similar organisms in both these situations increases the difficulty that is met with in deciding the question of the path of infection in cases of antral suppuration.

In certain cases of antral abscess, the pus contains such organisms as the *B. influenzæ* and the *B. pneumoniæ* (Friedländer), organisms which are commonly associated with respiratory diseases. These cases therefore may be regarded as of undoubted nasal infection. In two cases of antral abscess ascribed by the patients to nasal catarrh and influenza respectively, carious molar teeth were removed from the upper jaw at the time of the antral operation. The teeth were examined bacteriologically, and found to contain such organisms as the *B. necrodentalis* and *B. gangrenæ pulpæ*. The pus from the antra showed no similar organisms, but contained the pneumococcus, staphylococci, and the *Streptococcus*

pyogenes. Here the clinical evidence of a nasal infection is corroborated by bacteriological examination in so far at least as the absence of dental organisms shows. Bacteriological examination of carious teeth extracted from the upper jaw in cases of antral suppuration has been limited to a few instances. While the distinctive bacilli associated with caries were found in the teeth, in no instance were they recognised in the pus from the antrum in the same cases. Again, in the cases which have been clinically ascribed to dental infection, examination of the pus from the antrum has not revealed the presence of bacilli characteristic of dental caries. It has been asserted by Stanculeanu and Baup, in their paper upon the bacteriology of the nasal sinuses, that the pus from an antral abscess due to dental caries can be distinguished in two particulars from that which has originated in connection with a nasal infection. In the former case, the pus is fœtid, and contains, amongst other organisms, such anaërobic forms as the *B. ramosus*, *B. perfringens*, *B. serpens*, and *B. thetöides.* In nasal cases, on the other hand, the pus is non-fœtid, and contains such organisms as the pneumococcus and streptococcus. We have been unable to corroborate the observations of these two workers. In the first place, in our experience, it is exceptional to meet with antral suppuration which is not fœtid; it is true that in some instances the patient may deny the existence of any bad odour. In more than one case where this statement has been made, we have observed marked fœtor on evacuating the pus, so that too much reliance must not be placed upon patients' statements. In cases in which the clinical history pointed to infection by the nasal route, fœtor has been complained of. In only one instance have we found any of the organisms described by Stanculeanu and Baup, and in that case the *B. perfringens* was present. The case was a very chronic one, and the patient had regarded her condition as due to influenza.

While the evidence which we have been able to bring forward is rather in favour of the nasal passages as the path of infection in antral suppuration, we have also evidence to show that infection takes place in connection with disease of the teeth. In certain cases of antral abscess, organisms associated with dental caries are found in the pus, as, for example, the *B. dentalis viridans* (Goadby[1]) and the *B. plexiformis* (Goadby[2]). In our series we have two cases in which the bacilli of dental caries were found in the antral pus; in both instances clinical evidence went to show that the teeth were responsible for the mischief. Again, we find that in some cases of antral abscess the pus exhibits organisms which, while not exclusively confined to the mouth or teeth, are usually present in dental caries. Such organisms are the *Streptococcus pyogenes brevis*, the *B. mesentericus* and staphylococci. The first of

[1] "The Mycology of the Mouth."
[2] *Journ. Brit. Dent. Ass.*, London, 1900, vol. xxi.

these we have found in four cases, and the second in three cases of antral suppuration. As the same organisms may, however, have gained access through the nasal chambers, the difficulty in estimating their exact relation to the path of infection is increased. It is evident, therefore, that just as we are able to recognise clinically cases of antral abscess of nasal and dental origin, so also we can do so by bacteriological examination, but the evidence supplied by the latter method of investigation leads us to favour the view that the nasal passages are the more common routes for such infection.

THE ASSOCIATION OF NASAL POLYPI WITH SINUS SUPPURATION.—Every surgeon who has examined a number of cases of suppuration in one or more of the accessory sinuses, is cognisant of the fact that nasal polypi are present in a number of the cases. While rightly assuming, we think, that in the majority, if not in all of them, the polypi are secondary to the suppuration, we have often found it difficult to explain why they should be present in one case and not in another. More than one explanation of this clinical fact has suggested itself to us: first, that the nasal polypi may more often occur in those cases in which the suppuration has existed for a considerable period of time, that is to say, in the more chronic cases. Again, that the polypi may occur more often when more than one sinus is affected, where, in other words, there is associated sinus disease. Lastly, that development of polypi might be influenced by the character of the organisms present in the purulent discharge. We shall now proceed to sift the evidence for or against these propositions, and ascertain whether any light can be thrown upon the etiology of nasal polypi in cases of accessory sinus suppuration.

In order to ascertain whether any relation exists between the development of nasal polypi and the duration of the discharge from the sinus, the notes of ninety cases of antral suppuration uncomplicated by any other sinus affection have been examined. Of this number forty-six belong to the series of antral cases investigated bacteriologically. It was deemed advisable to consider the relation of polypi to the chronicity of the discharge in cases where only one sinus was affected, so that the conclusion arrived at might not be invalidated by the introduction of a second factor, namely, the co-existence of suppuration in the frontal sinus or ethmoid cells. Of the ninety cases of antral suppuration, only seventeen, or 18 per cent., had nasal polypi, the remaining seventy-three had none. Twenty-five of the cases come under our classification of recent cases, that is to say, the discharge had existed for less than one year, varying indeed from a few days to seven months. In none of these were any polypi present within the nose. The remaining sixty-five were chronic cases, the duration of the discharge varying from one year to twenty years. The seventeen polypus cases occurred amongst these alone, giving

a percentage of 26, when estimated in connection with the long-standing cases.

If we examine the actual period of the purulent discharge in the polypus cases, we find that considerable variation is met with in this connection. Thus, in five of them, the polypi were observed after the discharge had existed for two years; in eleven, there were polypi where the nasal discharge had been noticed from five to ten years; in one case polypi were present with a history of antral mischief for twenty years.

Turning next to the antral cases in which there were no polypi, and no history of the previous removal of such, we find that they include quite a large number in which the discharge dated from two to ten years. On the other hand, again, no polypi were found in the nasal chambers of individuals in whom the antrum had discharged for twelve, fourteen, and sixteen years, and in three instances also in which the discharge had persisted for twenty years.

It is evident from the above analysis, that in cases of antral suppuration, uncomplicated with disease in any of the other sinuses, polypi do not frequently occur, while in recent cases, of less than one year's duration, they have not been met with in our series; in the more chronic cases, the duration of the discharge must be regarded as an uncertain factor in the production of the polypi. Indeed, we are not inclined, at any rate arguing from the small series here reported, to attach any importance to it.

The second question which has presented itself in connection with nasal polypi and sinus suppuration, is the apparently greater frequency with which these structures are met with when more than one sinus is the seat of suppuration. Thirty-six cases of associated sinus disease have been examined in this connection. In nineteen the frontal and maxillary sinuses were involved, in eight the antrum and ethmoid cells, and in nine the frontal, ethmoid, and antral cavities. Twenty-one of these, or 58 per cent., had nasal polypi, the remaining fifteen had no polypi. Of the nineteen forming the combination of frontal and antral suppuration, five had polypi; in all the eight cases of antral and ethmoidal disease there were polypi; of the nine in which the frontal ethmoidal and maxillary sinuses were diseased, eight showed polypi. Though the series is a small one, a striking difference is to be observed in the relative frequency of the occurrence of nasal polypi in the simple antral cases, and in those cases where more than one sinus is affected. In the former, 18 per cent., or 26 per cent. if only chronic cases are considered, and in the latter 58 per cent., had nasal polypi. Further, it is interesting to note that of the seventeen cases in which the ethmoidal cells were associated with the suppuration, there were polypi in sixteen. We have also notes of four other cases in which the ethmoidal cells alone were affected, and in all of them polypi

were present. The occurrence of nasal polypi in association with ethmoidal suppuration is therefore well illustrated in these cases. In this series of cases, just as in those of simple antral suppuration, the duration of the discharge appears to be a factor of little moment. All, with one exception, come under the category of chronic or long-standing cases. In the recent case there were no polypi, while in the long-standing no relation could be detected between the duration of the discharge and the incidence of the polypi—two cases in which the suppuration had continued for twenty years being entirely free from such structures.

A study of the organisms met with in the pus in cases of suppuration associated with nasal polypi, and a comparison with those found in the discharge from non-polypus cases, was also made. This examination was carried out rather as a matter of curiosity than from any expectation of finding a bacteriological explanation of the presence of nasal polypi. As the *Streptococcus pyogenes* was found to be the predominant organism in the chronic cases, and as the polypi were met with in this class only, our attention was directed towards investigating the relative frequency of the streptococcus in the polypus and non-polypus cases. The result, however, proved to be of an entirely negative character. The *Streptococcus pyogenes* was found in fifteen of the seventeen cases with nasal polypi; it was also present, however, in the pus in eleven out of the seventeen cases in which there were no polypi, care being taken, in the selection of the cases for comparison, that the duration of the discharge should be, as nearly as possible, for a similar period. In both series the streptococcus was frequently associated with one or both of the other main groups, namely, staphylococci and the pneumococcus. The points that we have recorded here in connection with nasal polypi in association with accessory sinus suppuration, are certainly interesting in themselves, and special significance may be attached to their conjunction with ethmoidal suppuration.

Results of Treatment of Antral Suppuration.—In the treatment of uncomplicated cases of antral suppuration in which no other sinus is involved, our practice has been to open the cavity through the alveolar margin of the jaw, introduce an obturator, and instruct the patient regarding the manner of carrying out lavage. Exception to this routine method has been practised under certain circumstances. In a very small number of cases in which the suppuration had only persisted for a few days before treatment was demanded, the antrum was washed out after puncture of the outer wall of the inferior meatus of the nose. In three cases where a complete set of sound teeth were present, the antrum was opened through the canine fossa, in two of the cases the radical operation being performed at once at the request of the patients. Occasionally the radical operation has been performed without any preliminary course of lavage. The radical

operation consisted in making a large opening through the canine fossa, in curetting the altered lining membrane of the cavity, and in completing the procedure by making a counter opening into the nose through the outer wall of the inferior meatus. We propose now to examine, as far as is possible, the results of treatment in the uncomplicated cases of antral suppuration which have been bacteriologically investigated.

Recent Cases of Antral Suppuration.—Of the thirteen cases in none of which the discharge had persisted for more than seven months, eleven were treated by an opening made through the mouth, followed by a course of lavage. Two refused treatment. Of the eleven cases thus treated, nine were cured without further interference; one was subsequently cured by the radical operation after washing had been carried out for one year without success. In the eleventh case the operation has been too recently performed to permit of the final result being stated: the condition, however, is improving. In these recent cases the duration of the lavage necessary to effect a cure varied from three weeks to five months. The period of treatment required for effecting a cure was not found to be in ratio with the duration of the discharge before operation was carried out. The cases clinically regarded as dental in origin healed as satisfactorily as those ascribed to nasal infection. The case which subsequently required a radical operation was ascribed to influenza, and the discharge had persisted for three months before the preliminary treatment by lavage was commenced.

We have already alluded to the fact that in the recent cases the pneumococcus was commonly present. It was found in eleven of the thirteen recent cases, and in nine of the eleven cases operated upon. It was associated with the *Streptococcus pyogenes* in five of these, and with staphylococci in eight. A cure was effected by lavage alike in the pneumococcal cases with and without association with the *Streptococcus pyogenes* and the staphylococci.

Long-standing Cases of Antral Suppuration.—When we examine the history of the forty-four cases grouped as "chronic," we are unable to record the same satisfactory results from treatment. It is unfortunate that a considerable number refused treatment, while others who were treated have been lost sight of, thus reducing the total number of observations. Thirty cases in this group underwent treatment, the remaining fourteen either refusing altogether or postponing operation until some more convenient period. Of the former, six submitted to the radical operation at the outset, a cure being effected in each case. Twenty-four were treated by lavage after operation through the alveolar margin of the jaw. Of these, we find that in six it is impossible to obtain accurate information of the existing condition, and that in five sufficient time has not yet elapsed since

the operation to admit of any decision regarding cure or failure. Of the remainder, six have been cured; five are still discharging, and we consider that ample time has been given to effect a cure, but that by lavage this is no longer possible. Two cases submitted to a radical operation after failure of lavage; in one a cure was effected: regarding the ultimate result in the other, we have no accurate knowledge.

Owing to the fact that a certain proportion of the cases have been lost sight of, and that in others sufficient time has not yet elapsed to admit of a definite statement regarding the ultimate result of treatment, we will confine ourselves to analysing the successful and the unsuccessful cases. The duration of the discharge prior to treatment in the six cases cured by lavage was found to be from one to two years in four, nine years in one case, and "some years" in the sixth case.

The pus in each of the cases contained the pneumococcus. This was associated with a staphylococcus in four, with the *Streptococcus pyogenes* in two, and with a diphtheroid bacillus in three.

In the seven cases in which lavage undoubtedly failed to effect a cure, the duration of the discharge preceding treatment was as follows:—In three cases it had persisted from one and a half to three years, in one four, in two others ten and twelve years respectively, and in the seventh twenty years. The pus in these cases contained the following organisms:—The *Streptococcus pyogenes* in six of the seven, associated with a staphylococcus in five and with the pneumococcus in five. In one of the cases the *Streptococcus longus* was the only organism obtained.

While we are obliged to admit that we are dealing with a small total, two facts nevertheless become evident in comparing the successful and the unsuccessful cases. In the former, the discharge of pus from the affected antrum was certainly of shorter duration, while the *Streptococcus pyogenes* was only twice met with. In the unsuccessful cases the discharge had persisted for a longer period, and the streptococcus was present in all but one of the cases. Further, when we recall the fact that nine of the eleven recent cases were cured by lavage in a comparatively short period, we are led to conclude that in advising a patient with regard to the kind of operation to be performed, we should be influenced by the statement which is made regarding the duration of the affection. Moreover, when we see the success which attends the radical mode of procedure in uncomplicated antral cases, we should feel further strengthened in a preference for this form of operation. Before regarding the presence of the *Streptococcus pyogenes* in the pus as an additional argument in favour of the radical procedure at the outset in chronic cases of antral suppuration, we should like to have a larger series of cases than the above. Nevertheless, the facts relating to the organisms as they stand are interesting and suggestive. On a future occasion

we hope to be able to give an account of experimental work in connection with the influence of different antiseptics upon the purulent discharge from the accessory sinuses.

CONCLUSIONS.—1. That the organisms found in the healthy nasal cavities belong to the same varieties as those occurring in abnormal conditions of the nose.

2. That the pus obtained from some cases of antral suppuration may combine organisms similar to those occurring in the buccal cavity.

3. That occasionally bacilli distinctive of dental caries may be isolated from the pus of an antral abscess.

4. That the healthy accessory sinuses are probably sterile.

5. That there are three main types of organisms commonly met with in suppuration of the accessory sinuses, namely, streptococci, pneumococci, and staphylococci.

6. That in the cases of chronic suppuration streptococci were found in 80 per cent., whilst in the more recent cases they occurred in 60 per cent.

7. That the swabs taken direct from the affected cavities provide from the bacteriological standpoint more trustworthy results than swabs taken in the same cases from the nasal cavities.

8. That in recent cases virulent organisms are met with twice as often as in cases of chronic suppuration.

9. That clinical evidence supports the view that the antrum is more frequently infected by way of the nasal cavity, and that this opinion is corroborated by bacteriological investigation.

10. That nasal polypi occur more frequently in cases of associated sinus suppuration, than in simple cases of antral abscess; their association with ethmoidal cell suppuration, whether occurring alone or as a complication of other sinus inflammation, is evident from the cases quoted.

11. That the recent cases of uncomplicated antral suppuration, as contrasted with those of a chronic type, respond more readily to treatment by lavage.

ON THE USES OF SALICYLATE OF IRON.

By F. J. GRAY, M.B.Edin., *formerly City Hospital for Infectious Diseases, Edinburgh.*

THIS agent is prepared by the addition of tincture of perchloride of iron to a solution of salicylate of soda—a precipitate deep violet in colour being produced; the product resulting from the addition of solution of salicylate of soda to perchloride of iron is rust-coloured to varying shades of yellow.

The formation of this violet precipitate can be avoided, or it may be redissolved when formed by the addition of a small quantity of chlorate of potash, and, instead, one gets a solution varying in colour from a deep violet to a vandyke brown, according to the quantity of pot. chlor. added.

Salicylate of iron, when recently prepared, acts as a powerful febrifuge even in small doses, without, as a rule, producing diaphoresis (diaphoresis was only produced in two tuberculous cases), and whether it is by simply reducing the temperature and giving the phagocytic and toxin destroying action of the blood and tissues free play, or by an actual antiseptic action, it has a specific effect in erysipelas and in acute tonsillitis. That the antiseptic effect is produced is doubtful, as the dose required throughout the shortened course of both diseases is so small as to make it improbable that any such effect is present. Although salicylate of soda and iron perchloride have been looked upon as incompatible on account of the heavy precipitate produced, nevertheless either as precipitate or in solution salicylate of iron is remarkably active, and one has used it both in the precipitated and dissolved state and found equal satisfaction with both.

(*a*) In Erysipelas.—Out of fifty cases of erysipelas, none lasted for more than forty-eight hours from the commencement of administration: and in the majority, at the end of thirty-six hours the disease, as far as its local appearances went, had markedly improved; and, in all, the temperature remained at or just below normal after the drop in temperature following the first or, at latest, the second administration.

As local treatment, linen cloths were employed moistened with water, or oatmeal water, and changed very frequently. When local pain was present, it was in most cases modified by the first and absent after the second or third dose. In all the cases the headache and general malaise disappeared at the end of eight hours. The only supplementary treatment employed was an evening dose of calomel, 1–2 grs., or a saline aperient in the morning. Patients were kept on milk diet until the temperature had become normal; thereafter, even with the presence of a foul and furred tongue, ordinary diet was resumed.

As a test case, the usual methods of treatment were employed in a case of erysipelas commencing in the lobule of the right ear, with bullous formation, and in spite of every method used the condition spread round the back of the head, coming forward over the left ear, across the face and frontal region, and again attacking the right ear: at this stage all other treatment was stopped, the temperature being between 103° and 104° F., when the administration of salicylate of iron was commenced: after two doses, at three hours apart, the condition progressed no further. The local symptoms rapidly subsided, and the patient made a good recovery. Encouraged by the success met with in this case, which

occurred about four years ago, the writer has since treated a large number of cases of erysipelas by the internal administration of salicylate of iron with remarkable success.

In several cases of erysipelas of the head and face, similar success was met with. In six cases of erysipelas involving the leg or arm, one employed as local treatment in addition acid carbolic compresses 1 : 40 or 1 : 60. In one case where phlebitis was present secondarily to erysipelas in a leg where large and numerous varicose veins were present, the phlebitic condition was greatly ameliorated, but did not finally yield until the fourth day after commencing treatment.

The mixture employed is made up by dissolving 1 drm. sod. salicyl. in 2 oz. of water. To this is added a mixture consisting of tr. ferri perch. 2 drms., pot. chlor. half drm., glycerin half oz., and water to 3 oz. Water is then added to make up to 8 oz. Of this two tablespoonfuls were given every three or four hours.

(*b*) In Acute Tonsillitis.—In 250 cases of acute tonsillitis, whether simple rheumatic, diphtheritic, or scarlatinal in origin, one has had similar rapid success. In cases of simple uncomplicated acute tonsillitis, resolution and cure have occurred in most in from twenty-four to forty-eight hours, and in all save one the anginous condition has been relieved within forty-eight hours. Even in cases when suppuration had occurred, the pus was rapidly absorbed, and thus the use of the knife or forceps was avoided. The relief following the first dose is, as a rule, so great that the patient falls into a sound sleep, and awakes much refreshed, with the temperature reduced, and the pain and swelling in the throat considerably lessened.

As local treatment, along with the internal use of the salicylate of iron, one has employed a gargle of iodine solution 7½ to 30 minims tinct. iodi to the 1 pint aq. four-hourly, and painting the tonsils and fauces with pigment; ℞ Tinct. iodi 2 drms., glyc. acid tannic ad 1 oz.; paint four- or eight-hourly as required. In some cases liq. hydrarg. perchlor. 2 drms. was added to the above pigment, the gargle and paint were used in simple cases thrice daily, and where the false membrane was extensive or resistant, every four hours.

In most membranous cases, whether true Löffler's bacillus was present or not, the membrane disappeared in the first twenty-four hours, in twenty after forty-eight hours had elapsed, and in one not until the fourth day. In this case replacing the iodine paint and gargle by a weak permanganate solution as gargle secured the desired effect, and the inflammatory condition and the membrane both disappeared in the twenty-four hours following the discontinuance of the iodine preparation—presumably a case of idiosyncrasy as far as the use of iodine went.

One may here observe that it is inadvisable to continue the use of the iodine preparations for throat or nose for longer than

three days, as after that an irritated, inflammatory condition of the mucous membranes is apt to set in; this rapidly disappears, however, on stopping the iodine and using weak alum. sulph. solution in its place as gargle or nasal douche.

In six cases of scarlatina anginosa one has been able to convert them into simple scarlatinas in the course of from two to three days by the combined use of salicylate of iron, iodine gargle 7 minims to 15 minims of tinct. iodi to 1 pint aq., and nasal douche of similar or half strength, with the pigment of iodine and glycerin tannic acid to the pharynx and fauces. In all six there arose no complications nor sequelæ.

In simple acute tonsillitis with or without the presence of pus, the result at the end of twenty-four hours' treatment is as in the case of erysipelas practically marvellous, and by acute tonsillitis one does not mean the slighter forms only, but also those of great severity.

(*c*) Other Conditions.—*In five cases of croupous pneumonia* in children, very small doses, 1–2 grs. sal. of iron, reduced the temperature to normal or just above normal. The crisis occurred on the fourth day, and was followed by rapid clearing of the lung. One did not altogether attempt to secure an artificial crisis. Slight epistaxis was present in all four cases.

In twenty cases of puerperal sepsis the use of salicylate of iron along with hot vaginal iodine douche (tinct. iodi 15 minims to 1 pint aq.) cleared up the condition in three to four days, and in one only did cellulitis occur in the broad ligament. In this case the patient refused to continue treatment after the second day, and as she felt perfectly well, got up and went about her ordinary employment. The condition got worse, but disappeared on resuming the treatment.

In six cases of sublingual adenitis and cellulitis one resisted treatment longer than two days, pus formed, but on increasing the dose slightly the inflammatory action subsided and liq. hydrarg. perchlor. c̄ t. cinchon. co. cleared up the condition entirely.

In cases of chronic cellulitis following a septic wound one has not had much success, but in all acute conditions of superficial cellulitis with high temperature one has had gratifying results.

In tuberculous adenitis and cellulitis, beyond reducing the temperature the condition remained unaltered.

In one case of recurrent tuberculous pleurisy of very persistent character, and for which tapping had been frequently performed, where also there was a persistent temperature of 102° to 103° F., there seemed to be no effect beyond reducing the temperature, and that was accomplished with a very small dose, but even with the small dose sweating was profuse. The administration of sulphonal, 10 grs. b.i.d., stopped the sweating, but the pleuritic condition remained unaltered.

In two cases of cancer—one a recurrent epithelioma of sub-

maxillary glands, the other a scirrhus of mamma, involving skin in both, with a great area of suppuration and slow cellulitic inflammation and infiltration—the use of salicylate of iron, beyond lessening the inflammatory action and suppurative process, seemed to have no effect. Those cases were, however, under observation for only three weeks, so one was unable to form any legitimate opinion with regard to its use beyond the fact that the temperature, general and local, was lessened, and that the discharge and inflammatory action were diminished.

In one case of rheumatic endocarditis with hyperpyrexia, when quinine, cold sponging, and cold pack failed to satisfactorily lower the temperature, which ran 107°·5 to 108° F., a dose of salicylate of iron = 5 grs., given every four hours and continued for three days, permanently reduced the temperature; the case recovering after much blistering and rest, with only slight evidence of mitral mischief.

In three cases of prepatellar bursitis, in conjunction with carbolic compresses of 1–40, salicylate of iron settled the condition in three days.

In the case of a child, æt. 5 years, convalescing from scarlatina, where chickenpox with high temperature developed, when the rash was well out, one administration = 1 gr. sod. sal. c. iron caused the temperature to fall from 104°·5 to 96° F., and a state of collapse resulted, which for three days looked dangerous, but at the end of that time, with the aid of the usual stimulants, the case cleared up and made an uninterrupted recovery from both scarlatina and chickenpox.

This is the only case in four and a half years where one has seen any dangerous symptom exhibit itself as the result of the use of salicylate of iron. In no other case did the pulse or cardiac condition show any dangerous feature, even in cases where marked cardiac debility or disease was present.

In several instances, the liq. strych. hydrochlor. was combined with the above prescription, but some alteration occurs, as shown by the change of colour and weaker action of the salicylate of iron.

The features in the use of this drug on which one would lay stress are the specific action in erysipelas and in acute tonsillitis, the smallness of the dose required, and the freedom from dangerous effects, the absence of sweating, and also how well it is tolerated by the stomach and by the patients, the taste being not at all unpleasant.

THE CONDITION OF THE BLOOD AFTER OPERATION AND FRACTURE.[1]

By Frank I. Dawson, M.D., F.R.C.S.Ed., *M'Cunn Scholar.*

This research was undertaken, in the first place, to find out what change is produced in the corpuscular elements and in the hæmoglobin of the blood by operation. Judging from analogy, it was thought that there might be a certain amount of leucocytosis, in order to remove the broken-down tissues present even after the simplest operation. Some work had been done on this subject in America, but practically nothing either in this country or on the Continent.

Previous Work.—Gaitskell (1) investigated five cases, and found that there was a considerable rise in the total leucocytes in the four that healed by first intention, and in three of these there was a marked increase in the polymorpho-nuclears.

King (2) examined two series of cases (seventeen cases). He found that the maximum of the leucocytes was reached, at first count, six to twelve hours after operation in nine cases; in some of the cases the maximum exceeded 20,000. The polymorpho-nuclears were also increased in practically all his cases.

Da Costa and Kalteyer (3) examined a series of cases, but indicate only roughly the changes in the leucocytes. In the great majority of cases there was a considerable increase in the leucocytes.

Cabot, Blake, and Hubbard (4), in a series of cases where blood was taken immediately after operation, found that there was an increase in most of them.

White (5) and Frazier and Holloway (6) note also that there is a considerable leucocytosis.

Scheme of Investigation.—After the investigation of the first few cases, it was found that there were marked changes in the leucocytes. It was then determined to find out when these changes came on, how long they lasted, and, in order to find out their cause, to note if they were in any way dependent on the loss of blood. Three series of cases were investigated—

(α) Where the blood loss was at a minimum, as in operations for hernia and appendectomies.

(β) Where the loss of blood was greater.

(γ) Where the loss of blood was considerable. No case was investigated where there was severe hæmorrhage.

The influence of the anæsthetic was then inquired into.

[1] From the laboratory of the Royal College of Physicians and the wards of the Royal Infirmary, Edinburgh. Summary of thesis submitted for the M.D. degree of Edinburgh University, and awarded the Syme Surgical Fellowship.

It was unfortunate that more cases were not available where a local anæsthetic was used. The special cases were—

(1) Two cases where a local anæsthetic was given.

(2) One case where a general anæsthetic was given, and no cutting operation performed.

(3) Dr. Noël Paton very kindly supplied me with the blood from two dogs, to which he was administering chloroform for the purpose of estimating its effect on metabolism.

An endeavour was also made to find out if the different anæsthetics varied in their effect on the leucocytes; but as chloroform was given in the majority of cases, it was impossible to prosecute this line of investigation. As a sequence to the above, it was found that there was considerable difference in the action of the two general anæsthetics on the red blood corpuscles, it being apparent that, while both had considerable hæmolytic power, that of ether was greater than that of chloroform.

(α) The temperature after operation in presumably aseptic cases was also considered. The whole series of cases show that it bears little direct relation to the changes in the leucocytes. Often where the temperature did not rise above normal, the leucocytosis was extremely high; and *vice versâ*, where the temperature rose to 100° (as it did in a few cases), the leucocytosis was frequently low, and the temperature usually did not rise till the leucocytosis was on its decline.

(β) It was then decided to investigate a series of simple fractures. Only those fractures which necessitated the patient being kept in bed were taken up. In fractures there is bruising and damage to the tissues considerably in excess of what occurs in a simple operation. Also, in some cases, we get considerable extravasation of blood; so, if the leucocytosis after operation is simply due to the endeavour of the body to remove waste material, we should expect the same in fractures, and in a greater degree. If the change is due to some other factor, such as would come through a wound, there should be no leucocytosis. It must be borne in mind that fracture cases are not subjected to the same restrictions of diet as operation cases.

Other points were then taken up and investigated in connection with the preliminary preparation of the patient: (α) general, (β) local—along with the effects of antiseptics and massage. The glycogen reaction was also tested in every case.

Clinical Results.—The real object of these investigations was to find out if routine examination of the blood would be of value in ordinary non-suppurative surgical cases. For example, where after an operation the case is causing anxiety, the patient appearing worse than he should be, the temperature being higher than might be expected, and there perhaps being considerable pain, we are unable to say whether anything has gone wrong with the wound or not. In the majority of such cases the

appearance of the wound would tell whether the case was going on smoothly; but in most operations it is desirable to disturb the patient as little as possible, and in others even the appearance of the wound might not yield the information desired.

In cachectic patients and those otherwise anæmic, where severe operations may be necessary, it is desirable if we could get an idea whether a general anæsthetic could be stood, and if so, which would be likely to have the least action on the red blood corpuscles.

METHODS ADOPTED.—I. (α) Routine examination of the leucocytes was made at least once before operation, usually about twenty hours previous to it, and, as far as possible, at the same time of day that the second examination was to be made. The apparatus used was the Thoma-Zeiss hæmacytometer, with the Zappert modification, and in every case five sets of 400 squares were counted, and in some a second series of five sets were counted.

(β) Similar counts were taken.

(1) On day of operation, usually two to four hours after it: in others, immediately after, or one hour after.

(2) The day after operation.

(3) Usually two or three times later; in some cases daily, in others every second day.

II. A differential count was also made on each occasion that the leucocytes were counted; here between 400 and 500 white blood corpuscles were counted on films stained by Jenner or Leishman. As all the films were prepared in the same way on slides, an accurate comparison can be made. After the leucocytes were counted in both ways, their relative and absolute numbers were tabulated.

III. Glycogen was examined for in almost every film by using a solution of iodine, potassium iodide, and gum acacia.

IV. In more than half the cases the red blood corpuscles were counted prior to operation, and after it for several days. Here the Thoma-Zeiss instrument was again used, five sets of sixteen squares being counted.

V. The hæmoglobin was estimated in five cases with Gowers' instruments. The estimates by this instrument are not absolutely accurate; but as the same instrument was used on each occasion, they are naturally in the same ratio to one another.

VI. Routine blood examination was carried on in the same way through a series of fracture cases. Here, of course, it was quite impossible to obtain a record of the blood previous to the fracture.

An endeavour was made, as far as possible, to avoid the physiological changes in the leucocytes due to digestion. In all the operation cases this is entirely obviated after operation, as the patient is on a minimum diet; but in counts previous to

operation, and in some of the fracture cases, it was not possible to completely eliminate this factor. The limits of a digestion leucocytosis are slight, and the increase is almost entirely one of mononucleated cells.

The average count of the leucocytes previous to operation was 8300, which is slightly higher than the average given in ordinary cases; but only three cases exceeded 10,000.

The average percentage of polymorpho-nuclears was 60·5. This is slightly lower than that usually found, and may be due to the impossibility of absolutely excluding the changes caused by digestion in counts prior to operation. Only two cases exceeded 75 per cent.

The cases may be grouped as follows:—

A. Operations where there was a Minimum of Hæmorrhage.
1. Inguinal and femoral hernia (six cases).
2. Interval operations for appendicitis (ten cases).
3. Joint cases and others, as varicose veins, varicocele, etc. (nine cases).
4. Exploratory laparotomies and gastro-enterostomies (seven cases).

B. Operations where there was slightly more Hæmorrhage.
1. Ventral and umbilical hernia (five cases).
2. Simple tumours of the breast (two cases).

C. Operations where there was considerable Hæmorrhage.
1. Bone operations, as excision of knee-joint (four cases).
2. Amputation of breast and clearing out axilla (seven cases).

D. Fractures (ten cases).

In each case (with one or two exceptions) the operation was performed about 11 A.M. on the day of the second blood examination.

All the cases pursued an apparently aseptic course, except two which developed *late* suppuration, due to the *Bacillus coli communis*, and one case which was decidedly septic (femoral hernia). Two of the semilunar cartilage cases gave rise to anxiety, but there was no real evidence of sepsis.

SERIES OF OPERATIONS WITH ILLUSTRATIVE CASES.

A.—Operations where there was a Minimum of Hæmorrhage.

A1.—Inguinal and Femoral Hernia (Six Cases).

Summary of Observations.—*Temperature.*—The average of the maximum recorded was 99°·4. This occurred—

On the first day after operation in three cases.
" second " " " two "

In one case there was no rise above the normal. And the time the temperature remained above normal averaged two days.

Blood.—Leucocytes averaged—

Prior to operation	8,800
Maximum after operation	17,000
Increase .	8,200

The lowest maximum being 14,000, the highest 20,400. This was reached in four cases four hours after operation, and in two cases on the day after. The average number of days before the leucocytes returned to normal was four, the earliest being on the second day, and the latest on the sixth day.

The polymorpho-nuclears averaged—

Prior to operation	62 per cent.
Maximum after operation	82 ,,
Average increase . .	20 ,,

The lowest maximum being 69·5 per cent., the highest 92 per cent. On four occasions the maximum was reached four hours after operation, and on two on the day after. The average time before they returned to normal was three days, the shortest being one, and the longest six.

The small mononucleateds decrease markedly, both relatively and in most absolutely, while the large mononucleateds were increased.

The eosinophiles were decreased in five cases.

Type Case, No. 6.—Male, æt. 36.—Operation for inguinal hernia and undescended testicle. Patient was well built and in good health. Chloroform was given for about an hour.

Day.	Hour.	Leucocytes.	Polymorpho-nuclears.	Small Mono-nucleateds.	Large Mono-nucleateds.	Transitional.	Eosinophiles.	Mast.
13	4 P.M.	8,200	60	33·4	5	0·25	0·25	0·5
14	11 A.M.	Operation	...	...	...	..	..	...
14	4 P.M.	20,400	92	5·25	2	.	...	0·75
15	4 ,,	11,600	73·75	21	4	1	..	0·25
16	1 ,,	10,600	77·5	18	4	...	..	..
17	1 ,,	9,800	73	19	7	0·75	.	0·25
20	1 ,,	8,600	69	27	1·5	0·5	1	1

The red blood corpuscles and the hæmoglobin scarcely varied, and the glycogen reaction was negative on each occasion. The temperature on the night previous to operation was 98°·8. Remained at this on day of operation, and on day after rose to 99°·2, falling next day to normal.

A2.—Appendicitis Cases (Ten).

Summary of Observations.—*Temperature.*—The average of the maximums was 99°·3. This occurred—

On day of operation in three cases.
On first day after operation in four cases.
,, second ,, ,, ,, three ,,

And the time the temperature remained above normal averaged 1·6 days.

Blood.—Leucocytes averaged—

Prior to operation	8,000
Maximum after operation	21,000
Increase . .	13,000

The lowest maximum being 16,500, and highest 31,500. In each case the maximum was reached four hours after operation. The average number of days before they returned to normal was 3·4, the earliest one, and the latest six days after.

The polymorpho-nuclears averaged—

Prior to operation	58 per cent.
Maximum after operation . . .	87 ,,
Increase . .	29 ,,

The lowest maximum being 83 per cent., and the highest 93 per cent., and in each case the maximum was four hours after operation. The average number of days before they returned to normal was 3·7, the earliest on the third, and latest on the sixth.

The small mononucleateds decrease markedly, and the large mononucleateds increase.

The eosinophiles show a decrease in each case, and in most are absent on the first two counts after operation.

Type Case, No. 12, female.—*Recurrent appendicitis.*—Patient was strong and appeared in good general health. Chloroform was given for about fifty minutes.

Day.	Hour.	Leucocytes.	Polymorphonuclears.	Small Mononucleateds.	Large Mononucleateds.	Transitional.	Eosinophiles.	Mast.
26	1 P.M.	9,000	45·5	52·5	1	0·25	0·5	0·25
27	11 A.M.	Operation	...	...	...	...	...	...
27	3 P.M.	18,200	83·5	11	3·5	...	1	1
28	12 ,,	12,600	85	11	3	0·25	...	0·25
30	3 ,,	8,000	58	38	2	0·25	1·5	0·25

The glycogen reaction was negative on each occasion.

A3.—Joint Cases and Others.

Summary of Observations.—The average of the maximums was 99°·7, this occurred on the day of operation in five cases, and on the first day after in three cases; the time the temperature was above normal averaged two days.

Blood.—Leucocytes averaged—

Prior to operation	7,700
Maximum after operation	14,700
Increase . .	7,000

The lowest maximum being 13,000, the highest 19,000; this was reached in four cases four hours after operation, and in four cases the day after operation. The number of days before they returned to normal averaged 2·25, the earliest being the first day, and the latest the fourth day.

Polymorpho-nuclears averaged—

Prior to operation	59 per cent.
After operation	80 ,,
Increase . .	21 ,,

The lowest maximum being 72 per cent., and the highest 90 per cent. In seven cases the maximum was four hours after operation. The average number of days before they returned to normal being 2·3, the earliest on the first day, and latest on the fourth day.

The small mononucleateds decreased markedly in seven cases, and the large mononucleateds increased in seven cases, while the eosinophiles decreased in six cases.

Type Case, No. 22.—Female, æt. 23.—*Removal of glands in groin.*—Chloroform administered for forty minutes.

Day.	Hour.	Leucocytes.	Polymorphonuclears.	Small Mononucleateds.	Large Mononucleateds.	Transitional.	Eosinophiles.	Mast.
6	3 P.M.	6,200	53	40	2·5	0·5	3·5	0·5
7	11 A.M.	Operation	...	...	...	...	...	...
7	3 P.M.	14,400	83	11	5	0·5	0·25	0·25
8	3 ,,	9,500	71	22	5	1·25	0·25	0·5
9	1 ,,	11,000	74	20·5	4	1	...	0·5
13	...	7,600	64	26·5	6·5	0·5	2	0·5

The red blood corpuscles and the hæmoglobin scarcely varied at all.

A4.—Laparotomy, Exploratory chiefly (Seven Cases).

Summary.—*Temperature.*—The average maximum recorded was 99·8, and the time the temperature remained above normal averaged two days.

Blood.—Leucocytes averaged—

Prior to operation	9,000
Maximum after operation	16,400
Increase . .	7,400

The lowest maximum being 9500, and the highest 22,000. It was reached four hours after operation in four cases, on the day after in two

cases, and on the second day after in one case. The average number of days before they returned to normal being three.

The polymorpho-nuclears averaged—

Prior to operation	65 per cent.
Maximum after operation . . .	87 ,,
Increase . .	22 ,,

Lowest maximum being 74 per cent., the highest 94 per cent.; in six cases the maximum was four hours after operation. The average number of days before they returned to normal was 3·5.

The small mononucleateds decreased in every case, while the large mononucleateds increased in six cases, and the eosinophiles decreased in four.

Type Case, No. 30.—Male, æt. 33.—*Gastro-enterostomy*, for dilated stomach, under chloroform first, and then ether.

Day.	Hour.	Leucocytes.	Polymorphonuclears.	Small Mononucleateds.	Large Mononucleateds.	Transitional.	Eosinophiles.
5	4 P.M.	10,000	66	29	4·75	...	0·25
6	11 A.M.	Operation	...	...	...	...	...
6	4 P.M.	17,200	85·25	11·25	3·5	...	...
7	4 ,,	15,200	75	13·5	10	1·5	...
8	4 ,,	10,200	71	15	10	1	3
9	4 ,,	7,600	67·5	25	7	0·5	...

There was scarcely any variation in the red blood corpuscles, and there was a faint positive glycogen reaction on the sixth, seventh, eighth, and ninth days.

B.—Operations where there was slightly more Hæmorrhage than in the preceding Series.

B1.—Ventral and Umbilical Hernia and Innocent Tumours of the Breast (Seven Cases).

Summary of Observations.—*Temperature.*—The average of the maximums was 99°·1, and the time the temperature remained above normal averaged one and three-quarter days.

Blood.—Leucocytes averaged—

Prior to operation	8,000
Maximum after operation	21,000
Increase . .	13,000

The lowest maximum being 15,500, and the highest 35,000; this was reached in every case four hours after operation. The average number of days that the leucocytes remained above normal was three.

Polymorpho-nuclears averaged—

Prior to operation	58	per cent.
Maximum after operation . . .	86	,,
Increase . .	28	,,

The lowest maximum being 78 per cent., and the highest 90 per cent. The maximum was reached four hours after operation in six cases, and the average number of days before they returned to normal was three and a quarter.

The small mononucleateds and eosinophiles were decreased in each case, while the large mononucleateds were increased in six cases.

Type Case, No. 33.—Female, æt. 32, healthy and well developed, with ventral hernia. Operation under chloroform about fifty minutes.

Day.	Hour.	Leucocytes.	Polymorphonuclears.	Small Mononucleateds.	Large Mononucleateds.	Transitional.	Eosinophiles.
28	4 P.M.	8,200	52·5	42·5	1·5	1	2·5
29	11 A.M.	Operation	...	...	...	...	...
29	4 P.M.	17,000	90	7	2·5	0·5	...
30	4 ,,	14,000	85·5	10	3	0·75	0·75
1	1 ,,	11,000	60	27·5	10	1·5	1
2	4 ,,	8,000	63	26	8	1	2

The temperature was as high as 99°·2 on the day after operation: the red corpuscles scarcely varied at all, and there was a faint positive glycogen reaction on the thirtieth day.

C.—Operations where there was considerable Hæmorrhage (Eleven Cases).

C1.—Malignant Breast Cases, etc.

Summary of Observations.—*Temperature.*—The average maximum was 99°·4, and the time the temperature remained above normal averaged two and a half days.

Blood.—Leucocytes averaged—

Prior to operation	8,500
Maximum after operation	18,300
Increase . .	9,800

The lowest maximum was 12,000, the highest 24,800. The maximum was reached in five cases four hours after operation. The leucocytes returned to normal on the third day after operation.

Polymorpho-nuclears averaged—

Prior to operation	63	per cent.
Maximum after operation . . .	86	,,
Increase . .	23	,,

The lowest maximum being 76 per cent., and the highest 92 per cent. The maximum was reached four hours after operation in six cases. The average number of days before they returned to normal being 2·7.

The small mononucleateds and eosinophiles decreased markedly in each case, and the large mononucleateds increased.

Type Case, No. 44.—Female, æt. 53.—Breast was amputated and axilla cleared out under ether; operation lasting about an hour; the patient was in good general health.

Red Blood Corpuscles.	Day.	Hour.	Leucocytes.	Polymorphonuclears.	Small Mononucleateds.	Large Mononucleateds.	Transitional.	Eosinophiles.	Mast.
4,920,000	9	1 P.M.	10,000	67	29	3·5	..	0·25	0·25
..	10	11 A.M.	Operation	..	..	..	..	..	..
4,560,000	11	4 P.M.	24,800	84	12	2·75	1	..	0·25
4,450,000	11	12 NOON	15,300	71	21	7	0·75	0·25	..
4,310,000	13	1 P.M.	12,000	69	25·5	3·75	0·25	1	0·5
4,200,000	14	3 ,,	9,000	62	31	5·25	..	1·5	0·25
..	16	1 ,,	9,800	50·5	45	1·5	0·5	2	0·5

The red blood corpuscles showed a steady decrease daily after the operation, while the hæmoglobin varied very little. The glycogen reaction was negative on each occasion. The temperature rose to 100° on the eleventh day.

C2.—Knee Cases (Four).

Summary of Observations.—*Temperature.*—The average of the maximums was 99°·7, and the average number of days the temperature remained above normal was 3·75.

Blood.—Leucocytes averaged—

Prior to operation	9,000
Maximum after operation	22,000
Increase . .	13,000

The lowest maximum being 18,500, and the highest 30,000. The maximum was reached four hours after operation in each case, and the average number of days before they returned to normal was four and a half.

Polymorpho-nuclears averaged—

Prior to operation	60 per cent.
Maximum after operation . . .	89½ ,,
Increase . .	29½ ,,

The lowest maximum being 88 per cent., and the highest 91 per cent. The maximum was reached four hours after operation in each case, and the average number of days before they returned to normal was four and a half.

The small mononucleateds and eosinophiles were decreased in every case, while the large mononucleateds were increased in each case.

Type Case, No. 47.—Male, æt. 47, was operated on for tuberculous

knee, which was completely excised under chloroform. No nails were used.

Day.	Hour.	Leucocytes.	Polymorphonuclears.	Small Mononucleateds.	Large Mononucleateds.	Transitional.	Eosinophiles.
5	4 P.M.	8,000	68	27	3	1	1
6	11 A.M.	Operation	...	...	...	...	...
6	4 P.M.	20,000	91	7·5	1·5	...	...
7	4 ,,	14,600	85	8·5	5·5	0·5	0·5
8	4 ,,	11,600	75·25	15·75	6·5	0·5	2
9	4 ,,	8,800	75·5	15·25	8·5	0·75	...
12	4 ,,	6,000	65	26·5	7·5	0·75	0·25

The temperature rose to 100° on the day after operation, and continued thereabouts for five days; there was never any suspicious appearance about the wound. There was a slight positive glycogen reaction on the sixth, seventh, and twelfth days.

D.—Simple Fractures (Ten Cases).

Summary of Observations.—*Temperature.*—The average of the maximums was 99°·2; the average time before it returned to normal was 1·7 days.

Leucocytes.—In six cases the maximum was in primary count either on day of fracture or day after, while in four cases the maximum was in subsequent counts. The maximum varied from 8400 to 13,000, the average being 10,400, and the average minimum being 8100.

Polymorpho-nuclears.—In six cases the maximum percentage was in first count, while in four it was in subsequent counts. The maximum varied from 61 to 77·5 per cent., the average being 71 per cent., and the average minimum being 62·5 per cent.

The small mononucleateds appear slightly decreased in first counts in four cases, while the large mononucleateds appear increased in first count in seven cases.

Type Case, No. 54.—Male, æt. 33, fractured right tibia in lower third.

Day.	Hour.	Leucocytes.	Polymorphonuclears.	Small Mononucleateds.	Large Mononucleateds.	Transitional.	Eosinophiles.	Mast.
20	11 P.M.	Fracture	...	...	...	...	...	...
21	Noon.	10,800	77·5	15·5	5·75	0·75	...	0·5
22	3 P.M.	8,800	66·5	21·5	8·75	1	2	0·25
23	1 ,,	9,000	62·5	30	6	...	0·75	0·75
24	3 ,,	8,800	58	36·5	2·5	0·5	2	0·5

The glycogen reaction was negative on each occasion.

TYPE CASE, No. 59.—Female, æt. 40.—Fracture both bones of the leg.

Day.	Hour.	Leucocytes.	Polymorpho-nuclears.	Small Mono-nucleateds.	Large Mono-nucleateds.	Transitional.	Eosinophiles.	Mast.
4	6 P.M.	Fracture	...	...	...	...	...	...
5	3 ,,	8,800	71	20	7·5	1	0·5	...
6	1 ,,	9,000	74	19	6	...	0·5	0·5
7	4 ,,	9,200	77·5	18	4	...	0·25	0·25
8	3 ,,	8,600	70·5	24	4	0·25	0·1	0·25

The glycogen reaction was negative on each occasion.

EXPERIMENTS BY DR. NOËL PATON ON METABOLISM, *under and after Chloroform Anæsthesia.*

Blood supplied from two dogs showed—

1. Leucocytes definitely decreased in both cases. To a certain extent this was progressive.

2. The polymorpho-nuclears show a slight increase after chloroform, while the mononucleateds show a slight decrease, but in absolute numbers the polymorpho-nuclears were practically stationary.

3. Red blood corpuscles show no change except a slight increase in their number, which persisted.

TYPE.—Dog, bitch, was chloroformed by Dr. Paton, from 10.30 A.M. to 12.30 P.M.; again from 3 to 4 P.M.

Day.	Hour.	Leucocytes.	Polymorpho-nuclears.	Mono-nucleateds.	Eosinophiles.
9	3 P.M.	20,000	68·5	30·5	1
10	3 P.M.	21,000	...	...	...
11	Chloroform	...	...	...	...
11	4 P.M.	21,000	...	...	...
12	Noon	17,000	75	24	1
14	Noon	18,000	68	27·5	4·5

THE GLYCOGEN REACTION.

Of the fifty operation cases, twenty-seven gave negative reaction, twenty-three gave faint positive reaction of the first stage; two of these cases gave the reaction previous to operation, and in only three of these cases was there any suspicion of the cases being septic. Seven gave the reaction on one day, five on two days, six on three days, five on several days.

SUMMARY OF THE AVERAGE RESULTS OF THE SERIES OF FIFTY OPERATION CASES.

Temperature.—The average of the maximums was 99°·4, and the temperature remained above normal on an average 2·16 days.

Blood.—The leucocytes averaged—

Prior to operation	8,300
Maximum after operation	18,400
Increase . .	10,100

Lowest maximum 9500, highest 35,000. The maximum occurred four hours after operation in thirty-eight cases, and the average number of days before the leucocytes returned to normal was 3·3 after the operation.

Polymorpho-nuclears averaged—

Prior to operation	60·5 per cent.
Maximum after operation . . .	85·5 ,,
Increase . .	25 ,,

The lowest maximum being 69·5 per cent., the highest 94 per cent. The maximum took place four hours after operation in forty-three cases, and the average number of days before the polymorpho-nuclears returned to normal was 3·2.

The small mononucleateds decreased in forty-eight cases: the greatest decrease being four hours after operation in twenty-nine cases, and on day after operation in fourteen cases. The large mononucleateds increased in forty-six cases: the greatest increase being four hours after operation in ten cases, and on day after operation in twenty-eight cases. A comparison of the condition of the leucocytes after operation and after fracture shows—

1. That the leucocytes after fracture are scarcely increased at all, this being very different to what occurs after operation.

2. That the polymorpho-nuclears, although slightly increased after fracture, average nearly 20 per cent. less than after operation.

3. The large mononucleateds are also slightly increased after fracture, but not nearly to the same extent that they are after operation.

4. Small mononucleateds are very seldom decreased after fracture, thus being in striking contrast to what they are after operation.

5. The eosinophiles do not decrease after fracture in the same manner that they do after operation.

The Causation of the Leucocytosis.

Having thus indicated the various changes that take place in the leucocytes after operations, we may now proceed to inquire into their possible causes.

These may be indicated as—

(1) The blood loss at the operation. (2) The severity of the operation. (3) The anæsthetic. (4) Possible concentration of the blood due to the general preparation of the patient. (5) The local preparation of the patient. (6) The relationship between the rise in temperature and the rise in number of the leucocytes.

I. The Blood Loss at the Operation.—The cases were divided into three groups, according to the amount of blood lost. (1) Very

little; (2) little; (3) considerable. The temperature remained up slightly longer in group 3 than in 1.

The blood.—Leucocytes in the different groups more than doubled their average, the increase being slightly greater in group 2 than in the others, while this increase lasted a little longer in group 3 than in the others.

The polymorpho-nuclears.—Here there was practically no difference in the increase per cent. in the different groups or in the time this increase remained. There was also practically no variation in the other cells in the different groups. The small change in the red blood corpuscles and in the hæmoglobin point to the fact that in no case was the hæmorrhage severe. These results warrant the inference that the hæmorrhage at the operation has practically nothing to do with the changes in the leucocytes, although a severe hæmorrhage can by itself cause a considerable leucocytosis.

II. The Severity of the Operation (apart from the Hæmorrhage).—An analysis of the fifty cases would appear to show that the severity of the operation, although it seems to have some relation to the leucocytosis, still does not coincide at all with the presence of the leucocytosis, and only to a slight extent with the amount of the leucocytosis. In the same way a high polymorpho-nuclear percentage does not seem to be coincident with the severity of the operation.

III. The Anæsthetic.—Chloroform was used in the great majority of cases, pure ether in only three, and various mixtures and sequences in the remainder. (1) Only two cases of local anæsthesia were available for examination. (2) One case was examined where chloroform was given in order to break down adhesions by forcible movement. (3) Dr. Paton's experiments have been already tabulated.

Illustrative Cases.

Case 28.—*Gastrostomy performed under cocaine and adrenalin.*—The leucocytes rose from 12,000 to 22,000, and the polymorpho-nuclears from 74·5 per cent. to 90 per cent., and the temperature to 100°·4.

Case 23.—*Varicose veins, under cocaine and adrenalin.*—The leucocytes here rose from 8900 to 14,200, and the polymorpho-nuclears from 58 per cent. to 70·5 per cent. The temperature did not rise above normal.

Case 21.—Ankylosed jaw moved under chloroform, where the leucocytes fell from 7800 to 6800, and the polymorpho-nuclear percentage from 67 to 65; while the temperature rose to 99°. (No cutting was performed.) Both the experiments show a decrease of leucocytes continuing for several days after the chloroform was administered.

The only author who discusses the effect of chloroform on the leucocytes is Benazzi ([7]), who states that ether produces in animals a slight leucocytosis, while chloroform causes the leucocytes to

diminish. The effect of ether on the blood is one on which far more work has been done, although most of this has been in relation to its hæmolytic action.

Chadbourne ([8]) found that there was an increase of leucocytes after ether had been administered for sixteen minutes, but in differential counts this increase was found to affect polymorpho-nuclears and lymphocytes to nearly an equal extent.

Cabot, Blake, and Hubbard ([4]) found that of fifty cases examined after ether anæsthesia, only thirteen showed an increase of 2000 leucocytes and upwards, while seven showed a diminution.

Anders and Boston ([9]) state that, "while ether generally excited leucocytosis, this condition was of short duration, the leucocytes per c.m. returning to normal within twelve to thirty hours, and differential counts were never found to show any points of interest or value."

Conclusions concerning the effects of the anæsthetic.—(*a*) Judging from Cases 28 and 23, it is possible to get a leucocytosis running up to 22,000, and a polymorpho-nuclear percentage as high as 90 per cent. in a severe operation, and even in a minor operation we get a considerable leucocytosis and polymorpho-nuclear increase where a local anæsthetic has been employed. In Case 23 the changes were as marked as in many of the ordinary operations under a general anæsthetic.

(*b*) Judging from Case 21 and the two experiments, chloroform by itself does not produce either a leucocytosis or an increase of polymorpho-nuclears. In each case there was a decrease of the total leucocytes and of the absolute number of polymorpho-nuclears. Taken along with Benazzi's results, one is able to say that the ordinary post-operative leucocytosis and high polymorpho-nuclear percentage is not due to the general anæsthetic where that has been chloroform. It is, indeed, a question whether the use of chloroform does not retard the rise of leucocytes. In Case 28 the leucocytes remained high longer than usual, while there was absolutely nothing in the patient's condition or in the appearance of the wound to suggest septic infection.

IV. Possible Concentration of the Blood.—The preliminary preparation of the patient tends towards concentration of the blood, and this may also be helped by the anæsthetic (especially ether). It has been impossible to entirely exclude the results of purgation, but the comparative counts of the red corpuscles and the leucocytes enable one to judge fairly accurately whether the leucocytosis is due merely to concentration or not.

As in no case four hours after operation was there a marked increase in the red count, one is led to the opinion that the purgation is not severe enough to cause a regular depletion of the fluid constituents of the blood. A few instances will show the relation between the increase of the leucocytes and the condition of the red blood corpuscles.

CASE 42.—*Amputation of breast.*—Chloroform.

Prior to operation	. Red blood corpuscles,	4,400,000 ;	Leucocytes,	7,200.
Four hours after operation	,,	,,	4,200,000 ;	,,	18,600.

CASE 6.—*Inguinal hernia.*—Chloroform.

Prior to operation	. Red blood corpuscles,	4,800,000 ;	Leucocytes,	8,200.
Four hours after operation	,,	,,	4,820,000 ;	,,	20,400.

CASE 31.—*Gastro-enterostomy.*—Chloroform.

Prior to operation	. Red blood corpuscles,	5,100,000 ;	Leucocytes,	9,400.
Immediately after operation	,,	,,	5,200,000 ;	,,	10,200.
Eight hours after operation			...	,,	22,000.
Forty-eight hours after operation	,,	,,	5,000,000 ;	,,	13,400.

From these facts one is led to the conclusion that the preliminary purging and general preparation of the patient does not cause the leucocytosis after operation.

The after-effects of the operation and anæsthetic as regards sickness and vomiting seem to be slight.

Note.—1. The patient was not sick at all in the two cases where a local anæsthetic was used, and yet there was a marked leucocytosis in each case.

2. In the general series of cases, some cases were sick after operation and some were not, and yet the leucocytosis was as marked in the one series as in the other.

V. THE QUESTION OF THE LOCAL PREPARATION OF THE PATIENT. —The two points here are—1. The effect of the antiseptic agents employed ; 2. the effect of the friction and massage.

1. In order to test the effects of the antiseptics, a case (No. 24) was prepared two days previous to operation, and a carbolic poultice 1 in 60 was put over a large area. After the poultice had been on twenty hours, the blood was examined once more. The red blood corpuscles remained the same. There was a slight increase in the leucocytes (1000), and the polymorpho-nuclears were decreased by 5·5 per cent. This case reacted markedly next day after operation.

2. The effect of friction and massage in scrubbing on the day previous, and just prior to operation (Case 24), shows that if there is any change it does not last long ; and in several cases examined before and after massage, the leucocytes scarcely varied at all, and of course the scrubbing prior to operation is not nearly so vigorous, and does not last so long as ordinary massage.

The question of the use of antiseptics at the operation is important, but as in most cases there was no direct application of antiseptics to the wound, and as in many the operator's hands were washed in sterile salt solution, and as the instruments and

patient's skin were washed with it, the chance of the wound being irritated by the antiseptic was very small, and seems to have absolutely no effect on the results.

VI. The Relationship of the Rise of Temperature to the Leucocytosis.—If the rise of the leucocytes was either coincident with the rise of temperature or followed after it, one might be led to the opinion that the elevated temperature was the cause of the leucocytosis; and if they rose together or were present together, and if the leucocytosis was absent where the temperature did not rise, one might either come to the foregoing conclusion, or to the likelihood that both the rise in temperature and the leucocytosis were due to the same factors. From an analysis of the charts and tables of the fifty cases, one is able to state—

1. That the leucocyte maximum and the polymorpho-nuclear maximum takes place at least twenty-four hours, and in some cases forty-eight hours, before the temperature maximum, although in some cases the temperature maximum takes place on the day of operation at the same time as the leucocyte maximum.

2. That the leucocytes and polymorpho-nuclears remain above the normal longer than the temperature does.

3. That the fall of the temperature from its maximum is often by crisis, while the leucocytes almost invariably fall by lysis.

4. That it is possible to have a fairly considerable disturbance of temperature (2°) with what is practically a minimum disturbance of the leucocytes.

5. That the leucocytes and the polymorpho-nuclears often attain a high total where the temperature does not rise above normal.

It is evident that the temperature does not cause the leucocytosis, but it is possible that the causes of the temperature rise and the causes of the leucocytosis are the same.

Summary of Results and of their Possible Causes.

I. A rise of temperature of 1° F. very commonly takes place after operations. This is most commonly seen on the day after operation; it may return to normal in a few hours, or may continue for two or three days. It is quite independent of the appearance of the wound, as it may take place where the wound is healing by first intention.

II. After every operation the leucocytes apparently increase greatly in number quite independently of the numbers of the red blood corpuscles. This increase usually reaches its maximum a few hours after the operation. The leucocytes then return gradually and progressively towards their normal.

III. This increase is chiefly caused by the enormous increase

both in proportion and in absolute numbers of the polymorpho-nuclears, but is also maintained by the increase of the large mononucleateds, which is most marked when the polymorpho-nuclears are on the decrease.

IV. The small mononucleateds are decreased in practically every case in proportion, and usually in absolute numbers; they usually reach their minimum on the day of operation. The eosinophiles are usually also much reduced in number, while the mast cells vary.

V. In a certain number of cases a faint glycogen reaction may be obtained in the polymorpho-nuclears.

Possible Causes of the Leucocytosis.—After careful consideration of the evidence on both sides, one is led to the conclusion that—

1. The leucocytosis is not due to the hæmorrhage at the time of the operation, although if this be severe it may undoubtedly increase the leucocytosis.

2. Although the severity of the operation has some effect on the amount of the leucocytosis, still it is not the determining factor, some slight operations having much larger rises in the leucocytes than more severe ones have.

3. The anæsthetic employed is also not the determining factor, although ether by itself does cause a leucocytosis, still all the evidence we have been able to produce is that chloroform does not cause the change in the leucocytes, as they do not take place in simple chloroform cases, and as they are found where only a local anæsthetic has been employed.

4. The leucocytosis has no definite relation to the rise in temperature after operation, and as it usually occurs before this rise, it is evident that the temperature does not cause it; it is quite probable that the causes of the leucocytosis are the same as those of the rise in temperature.

5. The leucocytosis is evidently not due to the preliminary general preparation of the patient. The blood is not markedly concentrated at the time of the operation by the purging, and the effects of this purging, although they may produce a slight disturbance of the leucocytes at the time, have quite worn off by the time of the operation, and especially by the time the leucocyte changes are at their maximum. Nor does the blood seem to be so markedly concentrated by other causes, such as the administration of ether, to account for the leucocytosis, nor does the vomiting seem to have any effect.

6. (*a*) The local preparation also is not sufficient to account for the changes. The effect of antiseptic application previous to the operation being nil, the scrubbing of the parts, although it produces a hyperæmia, does not seem to cause the changes in the leucocytes. (*b*) The use of antiseptics during the operation may to a large extent be discounted, as the majority of

operations were performed without any antiseptic touching the wound.

7. The mere presence of blood clot and bruised tissues is not sufficient to cause such a marked leucocytosis, because, in fractures, where the local damage of the tissues is infinitely greater, and where, as in fracture of the patella, there may be considerable accumulation of blood, there are nothing like the same changes in the blood.

The changes in the leucocytes, which are to all intents and purposes the same as those seen in a pathological leucocytosis as in pneumonia, abscess formation, and peritonitis, must be due to some other factors than the foregoing, and we have now to consider the possibilities of their cause.

(*a*) It is not due to any special method of the surgeon operating, as the cases in the above series were operated on by six different surgeons, and with each one the changes were practically identical.

(*b*) Leucocytosis may undoubtedly be produced by severe muscular exertion. Cabot, Blake, and Hubbard ([10]) found that, after long and exhausting races, a marked leucocytosis was produced, with both relative and absolute increase in the numbers of the polymorpho-nuclears.

Here we have, with nothing introduced from the outside, but simply by substances produced by the body, the same marked changes that are found in a pathological leucocytosis. Now, is it likely that with operation cases we would get the same results? The chloroform might have caused them in this way, but we have seen that it does not, and there seems nothing else in operation cases to cause such a change when fractures do not do so, or only to a slight extent.

Theory as to Causation.—The changes are thus evidently a reaction of the body to something introduced from the outside, whether a mere physiological protective reaction, or the definite reaction against micro-organisms, it is impossible to say. It is well known that even with the most stringent precautions it is almost impossible to exclude bacteria altogether from operation wounds. Granted their presence, there ensues a reaction of the tissues whereby the leucocytes are able at once to overcome them without pus formation. The leucocytosis is thus protective, and diminishes the risk of the wound going wrong.

In favour of the hypothesis that the leucocytosis is due to reaction of the tissues in the presence of bacteria, we have the following points:—

1. That the numbers and varieties of the leucocytes are essentially the same as occur in an ordinary inflammatory leucocytosis.

2. The presence of a faint glycogen reaction in a certain number of the cases. Although the value of this is doubtful, as it

is present in other conditions, the inflammatory cause is the most likely when it develops where it had not been previously.

3. That so many other possible causes have been excluded.

4. That it is admitted that the absolute exclusion of micro-organisms from wounds is impossible.

5. That a very slight infection would be sufficient to account for the blood changes.

Against this theory it may be urged—that the patient gives no sign of an inflammatory infection either local or general; that so few cases ever go septic; and that cultures taken from under the nails and in the folds of the skin after thorough purification are practically always negative.

We see from our evidence that we have absolutely no direct evidence in favour of this theory, but there is strong deductive evidence in its favour. In the state of our knowledge it is impossible to say definitely what this leucocytosis is due to, but we can say that it is possibly, and quite probably, due to the reaction of the tissues against bacteria; and if not due to this, that it results from a reaction of the tissues to some effete bodies produced by the procedure of the operation in the same way that severe exertion causes a leucocytosis. There is no doubt that, however produced, the leucocytosis is bound to act as a protective agent, and that any bacteria that might possibly be present will thus be prevented from developing, and will be removed by the phagocytic action of the leucocytes.

Clinical Applications of the Results.—From a perusal of the cases recorded, it is evident that, if the leucocytes do not decrease considerably by the second day, there is probably something more than the ordinary reaction, and that the wound is really going septic. Also if, after the leucocytes have once decreased, we get a considerable secondary rise, the same conclusion is justified. In the same way, if we have the polymorpho-nuclear percentage remaining high or rising a second time, we again must look at the wound, but the polymorpho-nuclears in this connection are not so dependable as the total number of the leucocytes. It is evident that a negative examination of the blood is in some ways quite as important as a positive one. If we are anxious about the case, the temperature being high and the wound looking doubtful, the blood examination is of the utmost value. In such a case, if we find that the leucocytes are decreasing regularly, and if the polymorpho-nuclears are doing likewise, and if we get a negative result with the glycogen reaction, we have strong evidence in favour of the wound being all right.

It is evident, however, from the average condition of the blood, that it will be of very little assistance to us on the day of and day after operation, and in order to use the method successfully one must examine the blood previous to operation and some hours after it, as otherwise we shall not have a standard to go by.

NOTE AS TO THE ACTION OF THE ANÆSTHETICS ON THE RED BLOOD CORPUSCLES.—Judging from the figures obtained in the present series of cases of chloroform and ether, and from the work on ether by Da Costa and Kalteyer ([12]), King ([11]), Frazier and Holloway ([6]), and Anders and Boston ([9]), one can say that—(1) Chloroform has little action in destroying the red blood corpuscles, and practically no action in reducing the hæmoglobin; while, on the contrary, (2) ether, in practically all the records, had a hæmolytic action on the red blood corpuscles, especially in experimental work, and the hæmoglobin was considerably reduced. This hæmolytic action of the general anæsthetics, especially of ether, is of very great importance in operating on anæmic and cachectic patients, and should be taken into account in deciding whether to operate under a local or general anæsthetic, and which general anæsthetic should be used.

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REFERENCES.

1. GAITSKELL—*Guy's Hosp. Rep.*, London, vol. lvii. p. 65 and onwards. 2. KING—*Am. Journ. Med. Sc.*, Phila., vol. cxxiv. p. 450. 3. DA COSTA AND KALTEYER—*Ann. Surg.*, Phila., vol. xxxiv. p. 329. 4. CABOT, BLAKE, AND HUBBARD—*Ibid.*, vol. xxxiv. p. 361. 5. WHITE—Cabot, "Clinical Examination of the Blood," p. 254. 6. FRAZIER AND HOLLOWAY—Ewing, "Clinical Pathology of the Blood," p. 110. 7. BENAZZI—Bezançon et Labbé, "Traité hæmatologie," p. 689. 8. CHADBOURNE—*Phila. Med. Journ.*, 1899. 9. ANDERS AND BOSTON—*Therap. Gaz.*, Detroit, 1904, p. 730. 10. CABOT, BLAKE, AND HUBBARD—*Ann. Surg.*, Phila., vol. xxxiv. p. 372. 11. KING—*Am. Journ. Med. Sc.*, Phila., cxxiv. p. 460. 12. DA COSTA AND KALTEYER—*Ann. Surg.*, Phila., vol. xxxix. p. 344.

REVIEWS OF BRITISH AND FOREIGN LITERATURE.

A Manual of Midwifery for Students and Practitioners. By HENRY JELLETT, B.A., M.D. (Dub. Univ.), F.R.C.P.I., L.M. London: Baillière, Tindall, & Cox. 1905.

DR. JELLETT'S smaller works are so excellent that they will have led many to look forward to the publication of his larger work on midwifery. His reputation is fully maintained by its appearance, and it will assuredly take its place amongst the foremost works of its kind. It is something over a thousand pages in length, and probably represents the limit in size to which one man can safely go whilst preserving any individuality in the treatment of his subject. Even within these limits Dr. Jellett has availed himself of the assistance of others in the writing of one or two chapters. It is too often the case that a very large work becomes a mere compilation of isolated facts which burden the text and weary the reader. In the present work a good grasp has been kept of the materials, the essential points being brought well to the front. Whilst authorities have been freely quoted, more especially recent ones, they have been chosen with discretion, and really serve to illustrate the matter in hand. One feels instinctively that this is the work of a man who is interested in his subject, and who has, moreover, the gift of communicating his knowledge and his interest to others. It is especially in the pages devoted to treatment that we believe the book will be found so satisfactory by the man in practice. We are never left in any doubt as to what to do, nor is the practitioner, who consults it, left distracted by the opposing views of different schools and with the necessity of making his own choice. Where varying lines of treatment exist they are clearly discussed, and the course recommended by the author plainly put forth. We can do no more than glimpse at the book in detail. The author's views on the subject of accidental hæmorrhage are so well known, that it seems scarcely worth while to draw attention once more to the excellent results that have attended the routine use of plugging at the rotunda and elsewhere. In concealed accidental hæmorrhage, the author considers that some good may result from the same line of treatment in cases that are seen early, and this we can confirm from experience. A point that is worth insisting on in these cases is, "that when strong uterine contractions appear, a great deal of the risk disappears." A subject dealt with as a rule very inadequately in text-books is the relationship between pregnancy and heart disease. Dr. Drury, who has contributed the chapter on organic and functional diseases in pregnancy, goes into the subject in detail, differentiating between the different forms of valvular disease and the special effect

of each on pregnancy and labour. The result is a most valuable and practical chapter, the treatment of the different forms being given at some length.

Very sound advice is offered to the practitioner who has not had an extensive experience of operative obstetrics, on the subject of eclampsia. The importance of a simple clear statement on this subject cannot be overestimated.

In the chapter on extra-uterine pregnancy, the author says, "It is most probable, if not certain, that in all cases a decidua vera is formed in the tube." Although groups of decidual cells are found, it should be explained that no membrane at all comparable to that existing in the uterus is found in the tube. With regard to operating on hæmatoceles, he makes the statement that the vaginal route is probably the best in all cases. As a general statement we are not prepared to accept it. In a hæmatocele of recent formation there is considerable risk of setting up fresh bleeding, and we have known fatal results follow from this line of treatment.

For all that relates to the physiology and management of normal labour, we have nothing but praise; and for the author's views on the question of douching after labour, the administration of anæsthetics, and many such practical points, we can only refer to the book itself. We have already referred to Dr. Drury's able contribution to the work, and we should like to draw attention to the excellent chapter on surgical fevers, written by Dr. Rowlette.

We have no hesitation in most cordially recommending this admirable text-book to both students and practitioners.

Anatomy: Descriptive and Surgical. By Henry Gray, F.R.S. Sixteenth Edition. Edited by T. Pickering Pick, F.R.C.S., and Robert Howden, M.A., M.B. London: Longmans, Green, & Co.

The sixteenth edition of Gray's Anatomy, which has just been issued, follows closely upon the fifteenth edition of that work, which has been so well known to many generations of medical students and practitioners.

Nor is the reason for this popularity hard to find, for "Gray" is always accurate, usually contains any information desired, and is pleasantly written.

Unlike many other text-books of anatomy, the volume under review, like the other editions, includes a section dealing with general anatomy or histology, and it is certainly very advantageous to have a section on this subject in convenient proximity to a general account of the naked-eye anatomy of the human body, for the two subjects are really indivisible. No anatomist is content to have his field of work circumscribed by the limits of unaided vision, nor is any teacher of anatomy able to perform his task properly without reference to histology.

Any changes which have been made in this edition affect more the form than the contents of the work. Some desirable alterations have been made in several of the illustrations, and a further use of colour has been made. The text has been kept well abreast of recent work, and

an example of this is found in the inclusion of Keith's views on the development of the diaphragm.

Where so much is excellent, one only regrets that the illustrations still leave some room for improvement. It is unfortunate that the view of the trachea and bronchi on page 1014 does not show in a more characteristic manner the difference in direction between the right and the left bronchus.

One of the features of this book is the detailed account which is so uniformly given of the surgical pathology and applied anatomy of the different regions and structures, and the accounts of surgical operations are kept well up to date.

This edition is sure to meet with the favourable reception which has been given to former ones, and it may be recommended as a most excellent text-book to students and practitioners, both for study and for reference.

Essentials of Human Physiology. By D. Noël Paton, M.D., B.Sc., F.R.C.P.Ed. Second Edition. Edinburgh and London: William Green & Sons.

The second edition of this text-book has been considerably revised and enlarged; some unimportant matter has been cut out, the arrangement of material is better and clearer, and there have been added many diagrams, digests of recent discoveries, and a new section dealing with internal secretion, toxic action, and immunity.

Text-books of physiology have become very plentiful of late, and a new edition every year or two has become a necessity. The author has written his book with the intention of giving to medical students a volume which contains the essential facts of human physiology, but which is unlike the average text-book on the subject in that it dismisses briefly what the author considers unimportant, and emphasises those parts which have a direct bearing upon the study of medicine. Physiology is a wide subject, but all of it is capable of application to medicine, and what may seem of less importance to one person will be of more importance to another. The new edition comes more into line with other text-books; practical work is for the most part rightly omitted where it consists of experiments which are performed by the student in practical classes; the diagrams are useful, but some of the histological ones might have been left out. The material has been brought well up to date, but is necessarily unequal; some subjects are very briefly discussed, while others, as one would expect, are very thoroughly treated.

Essentials of Physiology for Veterinary Students. By D. Noël Paton, M.D., B.Sc., F.R.C.P.Ed. Edinburgh and London: William Green & Sons.

This must be a welcome work for veterinary students, presenting as it does the essentials of physiology, with special reference to peculiarities in the structure and function of the different organs of the commoner domestic animals. Human physiology has been largely built up by inference from the results of experiments on animals, so that the greater

part of it is common to human and veterinary medicine. The work is similar in size and arrangement to the author's "Essentials of Human Physiology"; much of it is identical, but matters dealing more particularly with human physiology are omitted, though not entirely, and special descriptions are added, *e.g.*, special neuromuscular mechanisms of the horse, with illustrations of the movements in walking, trotting, and galloping. The sections dealing with the alimentary canal, food, digestion, and metabolism are adapted to meet the different anatomical and functional requirements of some of the domestic animals, and particularly those of the horse; the chemistry of the secretions and excretions is also suitably dealt with. The book should prove a useful one to veterinary students.

Exercises in Practical Physiology. By AUGUSTUS D. WALLER, M.D., F.R.S. Part II. London: Longmans, Green, & Co.

THE second part of these exercises is a joint description by Waller and Legge Symes of experiments in chemical and physical physiology. It is a small book of seventy-nine pages, but covers a lot of work. The experiments are clearly described, and should be readily followed; they are practical, and there is no admixture of theoretical work. It is a book to be recommended to the student of physiology and clinical medicine.

Clinical Methods. By ROBERT HUTCHISON, M.D., and HARRY RAINY, M.D. Third Edition. London: Cassell & Co.

THIS book is deservedly one of the most popular of students' manuals, and it would be difficult to find a more concise and satisfactory account of the more important methods of clinical examination. The different procedures are judiciously chosen and clearly described, and a short indication of the significance of the results obtained in each case adds to the value of the book. This edition has been brought up to date. The chapter on clinical bacteriology has been revised, and notes on the trypanosomes and Leishman-Donovan body have been added. A short note on cytodiagnosis in pleural effusion might have been included with advantage. Plate IV., which represents "various forms of white (blood) cells," hardly does justice to the capabilities of Jenner's stain, and some of the cells represented are, at least, uncommon. It has never been our fortune to see a lymphocyte with sixteen vacuoles in its nucleus as well as eighteen in its protoplasm, nor are we familiar with the dappled structure shown in the figure of a transitional leucocyte. These may be small matters, but in a work which is so widely read, and which students frequently refer to and quote with an air of finality, we think that the illustrations should be as nearly typical as possible.

A Manual of Clinical Chemistry, Microscopy, and Bacteriology. By Dr. M. KLOPSTOCK and Dr. A. KOWARSKY. Translated by THEW WRIGHT, M.D. London and New York: Rebman Ltd.

THE aim of the authors of this book is to present in concise form the essential features of the subjects treated. The opening chapters deal

with the bacteriology of the mouth, nose, and conjunctiva. The following sections deal with the examination of sputum, gastric contents, fæces and intestinal parasites, urine and urethral discharges, blood, fluids obtained by puncture, and of cutaneous diseases. The sections on bacteriology are perhaps the best in the book, but the chapters on gastric contents, urine, and fæces are most praiseworthy. The histological sections are short, and several subjects usually discussed in works of the kind are omitted. The blood parasites other than malaria and the animal parasites of the skin are not mentioned. The illustrations throughout are good, and there are sixteen coloured plates, most of them showing representations of two microscopic fields. Although specially intended for the practitioner, the book will probably appeal more to the clinical pathologist and laboratory worker. It may be recommended as a valuable practical guide. The translator seems to have done his part well, but must be held responsible for an irritating repetition of the phrase "to be sure."

Atlas and Text-book of Topographic and Applied Anatomy. By Oscar Schultze. Edited by George D. Stewart. London and Philadelphia: W. B. Saunders & Co.

This volume is an English translation of Schultze's work on applied anatomy, to which Professor G. D. Stewart has added occasional notes, and in which he has made the text conform to English and American nomenclature. The author's preface states that the book is not written for the anatomist, but for him who wishes to become a physician; and it briefly but forcibly puts before the student the value of a knowledge of anatomy in practice, with the conclusion—"Think anatomically if you wish to become a physician."

A book of this kind certainly is of considerable value for the student, pointing out, as it does, how a knowledge of many of the details of anatomical structure and relationship is essential in order to understand the presence and meaning of many signs and symptoms, and the occurrence of complications in the course of disease, and, in short, demonstrating the value of a thorough knowledge of anatomy to the physician as well as to the surgeon. He who has eyes to see through the skin is far on the way to success in diagnosis and in prognosis, as well as in treatment.

As an atlas, the work contains twenty-two *lithographic* plates in colour, most of which appear to have been taken from His's models, and eighty-nine text cuts, many of which are in colour, and which in most instances are excellent, and are of far greater beauty than the other plates. This number of illustrations is, of course, not equal to the task of giving a complete account of the topographic anatomy of the human body, and we note that the anatomy of the brain, for instance, is almost entirely omitted, and there is only a brief account of Krönlein's method of cranio-cerebral topography. In dealing with other regions, however, the practical applications of anatomical facts are well presented.

The translation is, on the whole, satisfactory, but the American

spelling does not appeal favourably to an English reader, nor do we care for "vertebras" as the plural form for vertebra.

The volume may be recommended to the senior student as a useful guide to refreshing his knowledge of anatomy, but it must not be taken as being comprehensive in its scope. The questions which are appended to the end of each section will be found useful in stimulating the reader's thought, as well as in testing his knowledge of the subject, and are very practical in their character.

A Handbook of Clinical Electric-light Cystoscopy. By E. Hurry Fenwick, F.R.C.S. London: J. & A. Churchill.

Mr. Hurry Fenwick has shown himself an indefatigable worker in the domain of urinary surgery, and has brought out a new volume every second year or so for the last fifteen years. This, the latest of the series, is devoted to electric cystoscopy, and is appropriately dedicated to Max Nitze, the father of the electric-light cystoscope, "for it is to his genius that the profession is indebted for the method which has revolutionised our knowledge and greatly modified our operative treatment of surgical urinary disease."

Mr. Fenwick is an original observer, and the teaching of this manual is based upon his own experience of the Nitze method during a period of fifteen years. He does not advocate catheterisation of the ureter, nor does he employ the ingenious operating cystoscopes which bulk so largely in the practice of foreign specialists. His rules for the use of the ordinary cystoscope are clear and practical, and his descriptions of cystoscope appearances are graphic to a degree. We cordially recommend this handbook to all who are interested in this valuable addition to the armamentarium of the surgeon.

The Vermiform Appendix and its Diseases. By Howard A. Kelly and E. Hurdon. London and Philadelphia: W. B. Saunders & Co.

From every point of view this book constitutes a record in medical publications. It is truly a magnificent volume, comprising between its covers over 800 pages of text and 400 illustrations. The text is written in that stimulating and interesting style, abounding in apt and happy expressions, which we have learned to associate with the name of Howard Kelly. In addition to expressing his gratitude to those who have helped him in the production of the book, Dr. Kelly refers to the writings of other workers in the same field with an exactness and impartiality of criticism which do him infinite credit. Of the illustrations it is difficult to speak without having recourse to superlatives; it may certainly be said that they present a combination of artistic skill and practical utility which we have never seen equalled. Many of them illustrate conditions which every surgeon meets with in the course of his work, but few would have imagined that they could be reproduced with such accuracy and prove of such value from the teaching point of view.

The subject-matter begins with the history of appendicular lesions, and this is traced from the date of their earliest mention in 1759 to the present day. The evolution of their terminology—always a vexed question in lesions of the appendix—is fully considered. In chronicling the fact that the name *perityphlitis* was invented in 1832 by Puchelt and Goldbeck, it is commented that "surgery has no reason to be grateful for this denomination, as it is altogether misleading, directing attention from the real source of evil—the appendix—and clogging the wheels of progress for more than half a century." The reader joins in the evident satisfaction with which the authors introduce and quote from the memorable article by Reginald Fitz of Boston in 1886,—the coiner of the term *appendicitis*,—on whose behalf the authors maintain that he has done more than any single individual to bring about a right understanding of the morbid conditions affecting the vermiform appendix.

Where so many have contributed to the common knowledge of to-day, it is invidious to mention a few names, but in a field in which American surgeons have taken the first place, it is fitting that we should instance those of M'Burney, Senn, Weir, Fowler, Mynter, and Richardson, while among European surgeons the names of Roux, Talamon, Krönlein, Sonnenburg, Lennander, and Frederick Treves should not be omitted.

Leaving historical considerations, the proper subject-matter of the book begins with an account of the embryology and anatomy of the appendix, cæcum and ileo-cæcal fossa. The embryology of the appendix teaches us that it is a retrogressive organ, and that from the standpoint of comparative anatomy it must be regarded as an undeveloped cæcum. The functions of the appendix remain unsolved. The etiology of appendicitis is discussed without arriving at any newer conclusion than that the immediate cause of the disease is microbic infection, the how and the why remaining unanswered—to be solved, it may be hoped, by investigation in the near future. The chapters on the natural history of appendicular lesions and on the clinical features and diagnosis of appendicitis are fully elaborated. Separate chapters are devoted to the features of the disease as it is met with in children, and to the relations of appendicitis to the diseases of women and to pregnancy. The existence of a primary typhlitis is not denied, but its rarity is evidenced by the fact that the authors are unable to quote more than thirteen authenticated cases. The description of the operation for the removal of the appendix is replete with detail, and is beautifully illustrated. Many will agree with the authors' contention that, with proper precautions, the operation can, when necessary, be efficiently performed in a private house.

In a work of this size and in its first edition, it is remarkable there should be so few errors. We assume it to be an error on page 662, where it is stated that Sir Dyce Duckworth operated on a boy of 16 for the removal of a gangrenous appendix.

A Manual of Chemistry. By ARTHUR P. LUFF, M.D., B.Sc. (Lond.), F.R.C.P., F.I.C., and FREDERIC JAMES M. PAGE, B.Sc. (Lond.), F.I.C. London: Cassell & Co. Ltd.

WHEN a text-book reaches the third edition, it is almost superfluous to speak in its praise. Luff's "Manual of Chemistry" has long been the favourite text-book for medical students in the English schools. Although avowedly written for the use of those preparing for the examinations of the Conjoint Board, it is far from being a mere cram-book. The present edition has been largely rewritten and brought up to date, special attention being devoted to all those points likely to be of interest to the future medical practitioner. The section on organic chemistry has been enlarged, and now contains expositions on the more modern theories. The print is clear, and a special and valuable feature of the work is the dark-type headings of paragraphs. On the whole, it would be difficult to find a more suitable text-book for the medical student.

Introduction to Chemical Analysis. By HUGH C. H. CANDY, B.A., B.Sc., F.I.C. London: J. & A. Churchill.

IT is perhaps difficult to be original when dealing with the subject of simple testing, considering the number of books already published on the subject. This work is written on well-worn lines, there being nothing very new either in the matter or arrangement; the statements are correct, concise, and clear, and as a text-book it is as suitable for the medical student as many others on the same subject. The section devoted to the preparation of those salts set down in the scheme of the Conjoint Board is one of the best features of the book.

A System of Clinical Medicine. Vol. II. By THOMAS D. SAVILL. London: J. & A. Churchill.

More than three years have elapsed since the publication of the first volume of this book. In the second volume the author has again attempted to classify and describe diseases according to the symptoms they produce, a course naturally liable to lead to confusion and overlapping; but, on the whole, his efforts have been attended with a fair measure of success.

Of the five chapters contained in the present volume, by far the best is that devoted to diseases of the skin, perhaps because these best lend themselves to the author's system of classification.

The work will not displace the standard text-books of clinical medicine already published, but it may be used as supplementary to them, and as such we can recommend it as likely to prove useful to the practitioner of medicine seeking help in the diagnosis of an obscure case. As a manual of clinical medicine, we cannot recommend its use to the student, who must found his knowledge of disease, not upon symptoms, but on physical signs.

NOTES ON BOOKS.

THE ninth volume of the *Laboratory Reports* (Oliver & Boyd, Edinburgh, 1905), now before us, amply testifies to the valuable research work which continues to be carried on in the Laboratory of the Royal College of Physicians of Edinburgh, under the able direction of Sir John Batty Tuke and Dr. Noël Paton. Thanks to the enlightened generosity of Mr. Francis Mason, an organised series of investigations has been carried out on the physiology and pathology of the ductless glands, and the result of these are here set forth in a collection of most valuable papers. The first three of these, from the pens of Dr. Noël Paton, Alex. Goodall, and Lovell Gulland, bear more particularly on the physiology of the spleen. Dr. Noël Paton and Dr. W. B. Drummond, between them, contribute five papers relating to the suprarenal glands, with special reference to the action of adrenalin; while the physiology of the thymus gland has been investigated by Drs. Noël Paton and Goodall, and by Mr. James Henderson, M.R.C.V.S. A histological study of seventeen cases of pernicious anæmia, by Drs. Gulland and Goodall, is a model of scientific research applied to clinical material.

In addition to these researches on the ductless glands, a great deal of valuable work has been carried on in other directions. It is impossible even to mention all the papers which have emanated from the Laboratory, but we cannot refrain from referring to Mr. J. V. Paterson's able observations on "The Lymph Flow through the Eyeball in Man and certain Animals"; the investigations of the late Mr. E. P. Witten on "The Structural Changes accompanying the Ecdysis of the Crab"; Mr. E. Scott Carmichael's "Observations on the Effect of Introducing Foreign Bodies into the Gall Bladder"; Dr. Harry Rainy's studies of various nervous affections; and Dr. C. J. Lewis' study "On the Curative Effect of Carbonic Acid Gas in Cholera," etc. This selection sufficiently illustrates the wide range of the work pursued in the Laboratory of the Royal College of Physicians, which has for so many years been the centre of scientific investigation in Scotland.

In the *Principles and Practice of Asepsis* (Baillière, London) Mr. Arthur Styles Vallack presents us with a clear, succinct, and eminently readable summary of the present-day views on aseptic technique. The author's attitude is an exceptionally sane one, and he avoids the common error of laying undue importance on the machinery while overlooking the fundamental principles of antiseptic surgery. By an unfortunate printer's error, his axiom on the question of drainage of wounds is made to miscarry. As printed it reads: "*If septic, shut up; if aseptic, keep open; and the more septic, the more open.*" The context, however, makes the meaning quite clear.

Mr. Cecil H. Leaf has issued, through Messrs. Archibald Constable & Co. Ltd., London, a useful series of charts for the recording of rectal diseases.

In the third edition of his book on *Enlargement of the Prostate* (H. K. Lewis, London), Mr. Mansell Moullin has incorporated much of the work which has been done in this branch of genito-urinary surgery since the previous edition was published five years ago. It is interesting to note that that author still finds that M'Gill's operation is the one which "answers best in the majority of cases in which there is serious obstruction." Mr. Moullin seems to retain a higher opinion of the value of orchidectomy in the treatment of enlarged prostate than the majority of surgeons.

Surgeon-Lieutenant MacDonald has compiled a catechism of *Ambulance Examination Questions* (John Wright & Co., Bristol, 1905), to be used in conjunction with Warwick and Tunstall's first aid to the injured and sick. The majority of the questions are clearly framed, and are admirably calculated to test the knowledge of ambulance students. The author seems, however, to expect a good deal of his students, as he asks them, What structures pass through the diaphragm? what structures compose the neck? what organs may be injured when a man receives a bayonet wound entering at the umbilicus and reaching to the back bone? Information on these points seems to us to be as far beyond the needs of the ambulance student, as the patient referred to in the last question quoted will be beyond his aid.

This volume (*Transactions of the American Surgical Association*, vol. xxii.) contains a number of papers on subjects of general surgical interest. The authors include such well-known names as Dandridge, the brothers Mayo, Brophy, Abbé, Maurice Richardson, Murphy, Cabot, and Pozzi of Paris. Murphy's paper on the treatment of ankylosed joints contains the description in detail of a number of ingenious operations, whereby mobility is restored by the interposition between the articular ends of the bones of a flap of fascia derived from the parts in the vicinity of the joint. This paper is well worthy of the attention of surgeons in this country.

This volume of the *Transactions of the American Gynæcological Society* (1904, vol. xxix.) is noteworthy on account of a careful detailed account of an ovarian pregnancy by Dr. Clarence Webster. The author does not think it proved that the ovum is developed *in situ* in the follicle, but considers it not impossible that the impregnated ovum may, by means of its phagocytic properties, bore its way into the ovary from some depression on the surface. Dr. Webster considers that there is strong reason for believing that the fertilised ovum can only begin its development in tissue derived from the Mullerian tract, a view that, in the discussion following, was opposed by Dr. Whitridge Williams. Amongst other articles of interest is one on pyelitis occurring in the course of pregnancy, with a series of ten cases. This is a complication of pregnancy that has not yet received the attention it deserves in this country, and is no doubt responsible for many pyrexial attacks attributed to other causes.

RECENT ADVANCES IN MEDICAL SCIENCE.

MEDICINE.

UNDER THE CHARGE OF

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Diseases of the Urinary System.

Anomalies in the Urine.—*Pentosuria* (Sarvonat, *Gaz. d. hôp.*, Paris, 1905, June 3).—Pentoses are met with in the human urine under three different conditions—(1) As the result of their ingestion—alimentary pentosuria; (2) accompanying glycosuria; (3) idiopathic or essential pentosuria. As regards alimentary pentosuria, although pentoses are abundant in vegetable and certain animal tissues, only the former pass readily into the urine, and in all cases the pentosuria is moderate in amount. Diabetic pentosuria is comparatively rare, and the association of this substance with glucose in the urine does not appear to be of clinical significance. Fifteen cases of essential pentosuria have been recorded [short abstracts of these are given in the paper], and from them the clinical features of the condition may be sketched as follows:—It is a disease of adult life, chiefly in the male, and has no definitely family character. The only antecedents seem to be the nervous diathesis and the intoxicants morphine and cocaine. As a rule, no special symptoms are present; the pentosuria is discovered accidentally and diagnosed as glycosuria. The diabetic regimen usually prescribed has no good effect, however, but rather depresses the patient, while when the true nature of the condition is discovered, and a return to the ordinary mode of living permitted, he is as well as ever. Pentose reduces Fehling, but the fermentation and spectroscopic tests are negative; the only certain [laboratory] reaction is based on the melting-point of the crystals of pentosazone got by the phenyl-hydrazin test. Alimentary pentosuria is a mere accident resulting from a disproportion between the amount of pentose in the food and that which the body can utilise. The nature of diabetic pentosuria is obscure. Essential pentosuria has been supposed to be alimentary, but this is improbable, because neither an animal diet free from, nor one rich in, pentoses, has any effect on the urine. The idea that it may be due to nuclear destruction in the body is negatived by the absence of any increase of purin bodies in the urine. The paper is a valuable review of the whole subject of pentosuria, containing details of its chemistry and reactions, as well as a full bibliography.

Levulosuria, or *Fructosuria*, is the subject of two recent papers by Neubauer (*München. med. Wchnschr.*, 1905, August 8) and Graul (*Centralbl. f. innere Med.*, Leipzig, 1905, February 15). Levulose, or fructose, has hitherto been comparatively seldom recognised in the urine, and in most cases only in association with other sugars. Pure levulosuria is extremely rare, and Neubauer's case is one of the most carefully observed on record. The patient was neurotic, and had some of the symptoms of diabetes—emaciation, great thirst, and voracious appetite; his urine contained a reducing substance which rotated the plane of polarisation to the left, and otherwise gave the reactions of levulose. Observations on this patient showed—(1) That on a carbohydrate-free diet the levulose disappeared; (2) the addition of glucose in small amount, starch, or lactose did not produce any effect; (3) after the administration of galactose, traces of that substance appeared in the urine as under normal circumstances; (4) large doses of glucose gave rise to temporary glycosuria; (5) cane sugar (which contains levulose) caused levulosuria but no glycosuria; (6) inulin (the polysaccharide of levulose) produced no levulosuria. From these experiments it seems that the case was one of alimentary levulosuria purely; evidently the patient did not transform either albumins or carbohydrates in general into levulose, but only excreted what was ingested pure or combined with cane sugar. Neubauer's explanation of the abnormality is that levulose has a twofold destination in the body: that of conversion into glycogen and that of being oxidised directly in the tissues. He suggests that the latter function was in abeyance in his patient. A practical cure of all symptoms followed abstinence from sugary food. In contrast with this case of pure levulosuria, he cites that of a second patient who passed both levulose and glucose in the urine. Here a carbohydrate-free diet checked the glycosuria and levulosuria, while glucose and starches produced them. Levulose when given alone was not excreted, and lactose was also completely burnt up in the organism. In this case the levulosuria was due to the conversion of glucose into levulose.

Graul points out that among lævo-rotatory substances accompanying the dextro-rotatory glucose in the urine are albumin, β-oxybutyric acid, levulose, and others of less moment. Levulose is excreted when more is administered than can be consumed in the body, and when the limit of assimilation is pathologically lowered we have alimentary levulosuria. This occurs especially in hepatic derangement, and the appearance of the substance in the urine after doses not exceeding 100 grms. (half the amount which is normally assimilable) is a sign of functional insufficiency of the liver. Levulosuria in diabetes is of special interest, inasmuch as of all sugars levulose is that which most diabetics best tolerate; in the following case, observed by Graul, levulosuria was associated with alterations in the liver, which supports the hypothesis that normally the substance is consumed in that organ. The patient was a diabetic of the ordinary type, who also had an enlarged hard liver and some hypertrophy of the spleen. Under strict diet the glycosuria disappeared, and then, as fruit and wine were permitted, levulosuria developed. That this was due to the invert sugar in wine was proved by its cessation when the beverage was stopped. Experiments showed

that levulose administered even in small quantity was excreted as such; in larger quantities it was eliminated partly as levulose and partly as glucose. Inulin gave negative results.

Phosphaturia (Moraczewski, *Centralbl. f. innere Med.*, Leipzig, 1905, April 22).—This urinary anomaly is of three types: phosphaturia of children; phosphaturia of adults associated with neurasthenia; essential phosphaturia. The phosphaturia of childhood consists in excessive excretion of lime, and is said to be due to inactivity of the intestine, which is, under normal circumstances, the principal channel of excretion of calcium salts. Neurasthenic phosphaturia is rich in symptoms, but its chemical side has been little studied; in it also, however, the urine is relatively poor in phosphorus and rich in lime salts. Allied to it is the temporary phosphaturia which follows sexual excess, while in another category of transient forms come those due to alterations in the reaction of the urine from whatever cause. Moraczewski calls attention to an ill-defined form of chronic phosphaturia unassociated with neurasthenia. It is an anomaly of metabolism, sometimes combined with oxaluria, and frequently with the uric acid diathesis. Most cases occur in gouty persons, and the symptoms are chiefly local—dysuria, renal colic, stone, catarrh of the bladder and the passage of urine containing blood, mucus, and phosphates. The important practical point is that these cases do not improve when treated by acids, whereas under small doses of alkalies recovery is rapid. This apparent paradox is solved by the observation that in small quantities alkalies are stimulants to metabolism, and increase the acidity of the urine. From an elaborate analysis of the urine of six cases of phosphaturia and five controls, the writer concludes—(1) Chronic non-neurasthenic phosphaturia is characterised by a disproportionate excretion of phosphorus as compared with calcium. It thus differs from neurasthenic phosphaturia and the phosphaturia of children, in which the urine is rich in lime salts and relatively poor in phosphorus. (2) This faulty ratio of excretion is corrected by small doses of alkalies. (3) This form of chronic phosphaturia is characterised by retention of inorganic ions, and thus in some ways resembles gout. (4) Gout and phosphaturia may subsist in the same patient.

Cystinuria is the subject of an important paper by Simon and Campbell (*Johns Hopkins Hosp. Bull.*, Baltimore, 1904, November), of which, however, as it is mainly concerned with chemistry, only the main points can be referred to. In man, cystin administered by the mouth does not lead to increased elimination of neutral sulphur, but more than half of it is completely oxidised, and part is excreted through channels other than the urine. Cholalic acid decreases the urinary sulphur, and when given along with cystin checks its oxidation considerably. In individuals suffering from cystinuria, however, cholalic acid does not diminish the urinary sulphur.

Alkaptonuria.—An instance of this rare abnormality occurring in the course of typhoid fever is described (*Lyon méd.*, 1905, April 30) by Monisset and Bonnamour. The urine was albuminous, dark coloured, and was passed with difficulty; then there was abdominal pain, cystitis, and retention. The urine withdrawn by catheter had the colour of blood; no corpuscles, however, were present, hæmoglobin and hæmatoporphyrin were excluded, and the pigment gave the reactions of

alkapton. The points of interest are—(1) When the pain was acute the urine was deep red on being withdrawn from the bladder; at other times it had the characteristic of alkapton-containing urine, namely, though pale when passed it turned deep red on standing; (2) in this case the affection was temporary, whereas most cases of alkaptonuria are congenital and chronic.

Senile albuminuria.—With the object of ascertaining the prognostic bearing of albuminuria in the aged, Austin (*Boston Med. and S. Journ.*, 1905, July 13) has examined the urine of forty-five old men from sixty-four to ninety-five years of age. These he groups in three sets—(1) Mucinuria alone (sixteen), generally due to prostatitis; (2) albuminuria (nine), due to prostatic catarrh, pyelitis, or pyelo-nephritis; (3) albumin and mucin both present (ten). The author's deductions are, that while albuminuria is common among old men, mucinuria is yet more so; that both are associated with changes in the urinary apparatus, which are not, however, of serious import; that the low excretion of urea is not due to retention of molecules but to inactivity, restricted diet, and diminished metabolism; and that there is no connection between indicanuria and albuminuria.

Urine in collapse.—Klieneberger (*München. med. Wchnschr.*, 1905, July 4) has made a study of the urine, particularly as regards albumin and formed constituents, in various acute circulatory disturbances culminating in collapse. Among the conditions investigated were emboli in various organs, violent hæmorrhages from the lungs and elsewhere, pneumonia with collapse, peritonitis, and diarrhœa and vomiting. Klieneberger's principal result is that a fatal issue is often preceded by the occurrence of many casts in the urine. In cases of hæmorrhage which recovered he did not find these, and thinks that this may sometimes be of assistance in prognosis. Again, so long as peritonitis remains localised, the urine does not contain casts, but in general peritonitis these structures are usually found. From Klieneberger's work it would seem, speaking generally, as though in acute illness from any cause the presence of numerous hyaline casts is a grave sign indicative of profound circulatory disturbance.

Treatment of Renal Disease.

Grube (*Deutsche Med.-Ztg.*, Berlin, 1905, May 9) deals with the vexed question of the most suitable *diet for Bright's disease*. He sides with Rosenstein and van Noorden against Senator and Grainger Stewart in advising a mixed rather than a purely milk diet. Some cases of chronic nephritis are benign, others severe, and results are often ascribed to diet which are in reality dependent on the mildness or otherwise of the case. The alleged advantages of milk are that it diminishes the albumin, does not irritate the kidneys, contains no toxic substances, favours diuresis, and is entirely assimilated. Grube points out that to diminish albumin is not, *per se*, of great moment, that other diets are equally non-irritant, free from toxic substances, and assimilable, and that diuresis is not always desirable. The principal drawback to an exclusively milk diet is that it is insufficiently nutritious. He advises that red and white meat and eggs be given in the same proportions

as in an ordinary mixed diet, especially when œdema develops in consequence of cardiac feebleness. Details in support of this view are given briefly as follows:—In interstitial nephritis the quantity of urine is greater on a milk than on a mixed diet, but when the ratio of excretion to intake of fluid is considered, it is greater on a mixed diet. The specific gravity is higher on mixed diet. Albumin is on the whole less on mixed diet. In parenchymatous nephritis the results are much the same. In an instructive paper (*Journ. Am. Med. Ass.*, Chicago, 1905, June 24) Croftan discusses *inter alia* four new points in the *treatment of Bright's disease*—(1) Decapsulation he condemns absolutely. (2) Liberal feeding. Starving may suit acute cases; when the disease is chronic, full nutritive diet is required. Milk is insufficient both in general nourishment and in iron. (3) Restriction of fluid. It is unnecessary to urge the patient to drink largely. (4) Withdrawal of chlorides. If the œdema increases, chlorides should be tentatively withdrawn.

SURGERY.

UNDER THE CHARGE OF

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The Results of Interscapulo-Thoracic Amputations.

Jeanbrau and Riche (*Rev. de chir.*, Paris, 1905, August) have gone into the literature of interscapulo-thoracic amputations with a view to determining the ultimate results of these operations. They find that in cases of amputation for malignant disease of the shoulder not preceded by excision of the scapula or disarticulation of the humerus—(1) The operation mortality, which before 1887 was about 29 per cent., has now fallen to about 8 per cent. This improvement they attribute to asepsis and the adoption of the Berger-Farabœuf technique. (2) The mean period of survival is three years. (3) Cure is possible, as they have collected twenty-four cases in which the patient has survived more than five years. Among these we find patients alive more than ten, thirteen, fifteen, twenty, and twenty-one years after. It is interesting to us to observe that apparently the patient who survived longest was operated on by Syme twenty-six years before he was last seen. These observations are of great interest, as they demonstrate the value of this serious operation in prolonging life.

Doyen's Serum in the Treatment of Cancer.

At a meeting of the Société de Chirurgie of Paris, July 12, 1905 (Report, *Rev. de chir.*, Paris, 1905, September), M. Delbet made a report in the name of the Commission appointed to study the effects of Doyen's method of treating cancer. The report related to a series of twenty-six

cases treated by Doyen himself in his clinic. Nine of these cases were ruled out of court by M. Doyen, as he did not consider that they had been sufficiently treated to warrant conclusions being drawn, although they had had from fourteen to forty-four injections. M. Delbet remarks on the fact that among the cases which were admitted to have been sufficiently treated, were some in which only thirteen injections had been given. The observations extended over a period of six months, and the patients were regularly examined at fixed periods. All the twenty-six cases are brought under review in M. Delbet's report, with the following results:—Three cases are put aside, as the patients did not report themselves and the condition has not been followed up. One case, that of a lympho-sarcoma of the testis operated on three times, is free of recurrence after four and a half years. Two cases are stationary. In the other twenty cases the condition has become aggravated, in some instances very rapidly. M. Delbet concludes that the Commission has seen nothing to lead them to believe that M. Doyen's method of treatment has any favourable action on cancer. M. Delbet has himself treated three cases in his own clinique. In one case the condition has been stationary for two months; in the other two there has been a manifest aggravation of the disease. M. Kermisson has personally treated two cases with negative results.

Dry Iodine Catgut.

Moschcowitz (*Ann. Surg.*, Phila., 1905, September) has made an attempt to overcome the chief objection to catgut prepared after the method of Cladius, namely, its deficiency in tensile strength, by modifying the method of its preparation. In place of preserving the catgut in the original iodine solution for an indefinite time, he removes it from the iodine solution at the end of eight days, and thereafter keeps it dry and ready for use in a sterile vessel. In order to satisfy himself that this simple modification does not in any other way affect the qualities of the catgut, he has carried out an elaborate series of observations, which are described in the paper before us. As regards the *sterility* of the gut, he finds that this is in no way impaired by keeping it dry. Not only is the iodine catgut absolutely sterile, but the free iodine which it contains exerts an inhibitory, or even an antiseptic, action on organisms introduced into culture media, and the author believes that in practice the iodine may in a measure assist in neutralising accidental infections in wounds.

From a further series of experiments he draws the important conclusion that for all practical purposes iodine catgut is non-infectible, for example, from the hands of the surgeon or from accidental contact with non-sterilised articles within the field of operation. In this respect he considers iodine catgut far superior to catgut prepared after the method of von Bergmann.

From a large number of experiments carried out with the aid of a specially constructed machine, he is "perfectly satisfied that the iodine catgut has not only not lost any of its tensile strength, but apparently it has materially gained."

No new observations have been made on the absorption of iodine

catgut, but the author expresses his opinion that the knots stay tight and do not tend to untie or loosen, and he has never seen any untoward symptoms which could be traced to a too early or too late absorption. "The iodine catgut is more resistant to absorption than the von Bergmann catgut."

The only disadvantage resulting from the new method of preparation is, that the catgut is somewhat stiff, like a fine wire, although it has no tendency to kink up, and it soon becomes soft and straight.

The method of preparation is as follows:—"The catgut, just as it is bought from the dealers, *i.e.* without removing the fat, is loosely wound, preferably in a single layer, on to a spool, and tied at both ends in order to prevent unravelling. It is then immersed for eight days in a solution of—iodine, one part; iodide of potassium, one part; distilled water, one hundred parts. (The solution is prepared by dissolving the iodide of potassium in a small quantity of the water, to which the iodine, previously finely pulverised, is added, and the whole diluted up to one hundred parts.)" At the end of eight days the catgut is removed from this solution, and preserved dry in a sterile vessel, preferably in one not exposed to the light. It is used dry, just as it is cut from the spool, without any previous immersion in carbolic solution or sterile water. The method is exceedingly cheap, as one gallon of the solution costs only 42 cents.

The Surgical Treatment of Cerebral Tumours.

In a recent discussion (*Boston Med. and S. Journ.*, 1905, July 20) several American surgeons summarised their views on the present position of the surgery of cerebral tumours. Codman bases his opinions on an analysis of thirty-six cases treated at the Massachusetts General Hospital, and asks this significant question: "Should we not, instead of aiming to do a radical operation in cases of tumour of the brain, be satisfied with a purely palliative operation?" He is led to make this query by a consideration of several facts. In the first place, observations at autopsy reveal the fact that of all brain tumours, a very small percentage are really removable, and that of those that are really removable the greater number arise from the dura. Second, the records of twenty-eight cases in which the tumour was removable show that in no one case was the operation successful in curing the patient. Third, of the cases which survived the operation, a considerable proportion was improved only by the relief of pressure; and that in those cases which were not improved, the failure was probably largely due to the strangulation of the motor cortex through the trephine hole, or to damage done to the brain tissue. Lumbar puncture has not proved a satisfactory method of relieving intracranial tension. In two out of four cases the patient stopped breathing. In no case was any good accomplished by exploration in the brain tissue itself by means of incision, or explorations with probes or aspirating needles, unless on the surface of the brain itself there was some indication of the existence of a cyst or tumour. The author's conclusion is that "the chance of any success by radical operation is so small, that in any given case diagnosed as brain tumour, even if the symptoms give evidence of a more or less exact localisation,

it would be wiser to do an operation simply for the relief of intracranial tension, rather than to explore with the idea of removing the tumour." The operation suggested consists in raising a large osteo-plastic flap over a "silent" area of the brain.

Putnam also believes that even if a radical cure cannot be hoped for, a palliative operation is well worth performing. In his opinion better results may be hoped for in cases of syphilitic gummata and in tumours of the cerebellum. Lund also expresses the opinion that cerebellar tumours are more amenable to surgical treatment.

Walton and Paul have studied 171 autopsied cases, and have found that 7·5 per cent. were operable; 79·4 per cent. were inoperable; and 13·1 per cent. were doubtful.

OBSTETRICS AND GYNÆCOLOGY.

UNDER THE CHARGE OF

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Perforation of the Living Child.

Katz (*Monatschr. f. Geburtsh. u. Gynäk.*, Berlin, 1905, April) upholds craniotomy in certain cases when it is impossible to terminate labour otherwise. The cases are those in which the patient has been under the care of attendants who have examined with unclean hands, or caused injury to the bladder or uterus. Such cases are unfavourable for operation of any kind, and perforation gives the best results. The mortality of Cæsarean section, or symphyseotomy, should be nil if the cases were seen before the onset of fever, but in hospital practice this is not always the case. Katz gives the results at the Mannheim Maternity as follows:—Of 6935 cases delivered, there was twenty-six craniotomies, = 0·37 per cent.; maternal mortality, 7·69 per cent. After Cæsarean section the mortality has been 10 per cent., as has also been that after symphyseotomy. Katz refers to the prejudice among the public against Cæsarean section, in contrast to that of perforation. The indications for craniotomy in the twenty-six cases referred to were—rise of temperature, bad general condition of the mother, eclampsia, threatened rupture of the uterus. He thinks the operation of Cæsarean section should be impressed on patients as the best method of obtaining a living child, even where the indications are only relative as being the surest method of obtaining a living child; although there will always remain many cases that must be terminated by craniotomy.

Adenoma Hæmorrhagica.

Alexander (*Brit. Gynæc. Journ.*, London, 1905, February) reports five cases of this condition. The outstanding symptom in all was persistent bleeding in spite of all treatment. The size of the uterus and the appearance of the curettings presented nothing abnormal. All the patients were over thirty-four, and were treated by vaginal hysterectomy. On examining the interior of the uterus after removal, however, Alexander found a thick semi-gelatinous material affecting the whole mucous membrane, which Jessett regarded as a pre-cancerous condition.

Cæsarean Section following Ventral Fixation.

Clark and Bowley (*Johns Hopkins Hosp. Rep.*, Baltimore, 1905, March) reports a case of this operation three years after fixation of the uterus. External version was attempted two days prior to operation, and on introducing the hand to do internal version, a tear was found in the posterior wall of the uterus, necessitating immediate section. The fundus was found firmly adherent to the anterior abdominal wall, and formed with the lower segment of the uterus an acute angle, which made a shelf of tissue. The rupture was large enough to permit of the escape of part of the fœtus into the abdominal cavity. The rupture probably occurred after attempts at external version.

Prophylaxis and Treatment of Ophthalmia Neonatorum.

Davier (*Bull. Soc. d'obst. de Paris*, 1904, No. 4) recommends argyrol, which contains 30 per cent. of silver, as contrasted with 8 per cent. in protargol. For catarrhal conjunctivitis a 5 per cent. solution several times daily is used, for purulent ophthalmia 20 per cent. every hour, and as a prophylactic a few drops of the same solution immediately after birth. This strength causes no pain, conjunctival irritation, or secretion, as is the case with silver nitrate.

Abdominal and Vaginal Hysteropexies.

Jacobs (*Bull. Soc. belge de gynéc. et d'obst.*, Bruxelles, No. 11) gives the following statistics:—From 1890–1897 = seventy abdominal hysteropexies, twenty-nine subsequent pregnancies, twenty-six of those being in women who had previously borne children. Of the twenty-nine labours, seventeen were normal, one face case with forceps, one breech with version, seven miscarriages (one accidental, one placenta prævia). Vaginofixation—twenty-one cases, followed by eight pregnancies, three ending in abortion. Vaginal hysteropexy—sixty-nine cases, twenty-one subsequent labours all at term, three terminated by forceps. Jacobs points out the favourable results of this last operation, and has now given up the former operations entirely, in women of the child-bearing period.

Cancer of the Cervix.

Sampson (*Albany Med. Ann.*, 1905, May) divides cancer in this situation into that arising from the vaginal aspect of the cervix and that growing from the cervical canal, the former a squamous-celled carcinoma, the latter cylindrical celled, less frequent, but more malignant. There is no relation between the size of the primary growth and the occurrence of metastasis. When there is metastasis only a small number of cases can be cured, because it is impossible to remove all the lymph glands which may be involved. When the growth is seen at an early stage, a wide excision of the primary growth should be made, freeing the lower portion of the ureter, so as to permit of the parametrium being removed as far as possible. If the general condition of the patient permits it, the iliac lymph glands should be removed. No operation is justifiable unless the entire local growth can be removed. Sampson points out the great need of early diagnosis, as only about 20 per cent. of the cases are operable when first seen, and only about the same number are free five years after operation.

On the Rupture of Cicatrices of Cæsarean Section in Subsequent Pregnancies.

Werth (*Berl. klin. Wchnschr.*, 1905, No. 27) refers to eleven cases of this condition already published, and adds one of his own, where rupture of the uterus occurred two years after a previous Cæsarean section. The uterus had to be amputated. Werth believes that neither the material used for the suture or the site of the uterine incision have any influence upon the resistance of the cicatrix.

Has the Preliminary Vaginal Douche an Influence on the Morbidity of the Lying-in Period?

Ahlfeld (*Ztschr. f. Geburtsh. u. Gynäk.*, Stuttgart, vol. liv. No. 1) found that for a period in 1891-92 the douche being considered unnecessary was dispensed with, with the result that there was an increase in the morbidity rate. A temperature of 38° (100° F.), or over, was arbitrarily held the lower limit of morbidity. He gives the following figures:—In 7000 puerperal women, 662 in each thousand were fever free, *i.e.* under 38 per cent. In the first 5000 cases, 646 patients per thousand were fever free. In the last 2000, 698 per thousand were fever free. During the period when the douche was dispensed with, there were 700 cases, with 527 patients per thousand fever free, an increase of 15 per cent. over the average of the remaining 6300 cases. With the reintroduction of the douche during or before labour the results improved.

Ahlfeld noted a lowered rate of morbidity among the operative cases, due, he thinks, to the fact that an additional douche was given at the time of operation. Further, he found that in cases of streptococcic infection of the vagina, the colonies were greatly reduced in number a couple of hours after the vaginal douche. Ahlfeld therefore believes that the douche should be employed as a routine practice.

THERAPEUTICS.

UNDER THE CHARGE OF

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Antistreptococcic Serum in Phthisis.

Gray holds that pulmonary phthisis is in most cases sooner or later a mixed infection, in which, in addition to the toxins of the tubercle bacillus, the poisons elaborated by these secondary organisms—streptococcus, pyocyaneus, diplococcus, tetragenus, and staphylococcus—are also causing mischief. The secondary infection may occur early or late, with insidious or abrupt onset. With early infection the sputum is found to be loaded with the secondary germ, while the tubercle bacilli are few in number. When the infection occurs late in the disease, its onset may be shown by increased range of temperature, with or without malaise and local lung manifestations. When the secondary infection becomes well established, there is the typical hectic temperature, with progressive weakness and loss of flesh. Gray believes that in antistreptococcic serum we have a means of combating this secondary infection. He uses it in daily doses of 10 c.c., which after six or seven days are apt to produce a severe reaction, with erythema, urticaria, joint pains, and severe itching. In the course of the next few days these symptoms subside, and the patient is found to be markedly relieved. The cough is greatly lessened. The spit is reduced to a minimum, and contains almost no streptococci. The length of immunity to subsequent infection varies in the different cases, but a reinfection can be treated in a similar fashion. Not only the streptococcus, but also the other pathogenic bacterial forms, seems to be affected by the serum, so that after its use the sputum only contains minimal quantities of these organisms. On the other hand, owing to the scantiness and consequent concentration of the sputum, the number of tubercle bacilli seems relatively increased. The elimination of the pathogenic bacteria and the removal of the toxins clears the ground of complications, and renders the cure of tuberculous lesion a relatively easier matter.—*N. Y. Med. Journ.*, 1905, September 16.

Chloroform.

Gréhant has succeeded in producing complete anæsthesia in animals by employing a solution of chloroform in alcohol. In the ordinary method of chloroform inhalation the vapour is absorbed by the blood, and is carried to the cells of the nervous system. For oral administration chloroform in the pure state is too irritating, while water dissolves only a small quantity of chloroform. A more suitable solution is obtained

by dissolving 5 c.c. of chloroform in 1 litre of 10 per cent. alcohol. This solution produces complete anæsthesia in dogs. Thus a dog weighing 7 kilos. was given 350 c.c. of the solution by the stomach tube. This amount, equivalent to 1·75 c.c. chloroform, caused no irritation or excitement. The animal remained quite calm, and in the course of fifteen minutes the conjunctival mucous membrane became anæsthetic.

In other experiments it was found that the temperature in the rectum was always reduced considerably a few hours after the administration. At the same time the excretion of CO_2 in the expired air is found to be diminished.—*Bull. Acad. de méd.*, Paris, 1905, July 11.

Red Light Treatment of Scarlatina.

The effect of excluding all but the red rays of light has been investigated in many diseases. It is claimed that in smallpox, erysipelas, and eczema the cutaneous manifestations are lessened by excluding all but the red rays. Chopf has recently tested the effect of the red light treatment on scarlatina, and finds that this disease, too, is altered by it. His observations were carried out on a limited number of children. As soon as the patients were admitted to hospital they were placed in special rooms, in which red curtains allowed only red rays to pass through. He claims that as a result the fall of temperature occurred sooner and in a more critical fashion than in cases similarly treated with ordinary daylight. The redness of the skin becomes less marked under the influence of the red rays, but the pathological change in the skin is not cut short, since exposure to white light brings out the rash again.—*München. med. Wchnschr.*, 1905, No. 32.

Strophanthus.

Fränkel finds that it is quite easy to cause slowing of the pulse in healthy individuals by using strophanthus. No disturbance of the general health results even if relatively large doses are used. A rise of pressure is not produced, but if the slowing be counteracted by the simultaneous use of atropin, a rise of blood pressure is induced.—*München. med. Wchnschr.*, 1905, No. 32.

PATHOLOGY AND BACTERIOLOGY.

UNDER THE CHARGE OF

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The Spirochæte Pallida of Syphilis.

Information about this germ is rapidly accumulating. It all points to there being very little doubt that it is the causal germ of syphilis in all its manifestations, whether primary, secondary, or tertiary. A know-

ledge of its easy and rapid demonstration is thus becoming increasingly important. Several papers discussing suitable methods have recently appeared, three of them in the *Deutsche med. Wchnschr.* One of these, by Giemsa, appeared on the 29th June. Finding that the colouring solutions first recommended by him do not keep well, he now recommends a mixture of azur II.—eosin 3 grs., azur II. 0·8 gr.; Merck's pure glycerin, 250, and methylic alcohol, 250 parts each. This solution keeps a long time, even in the tropics. The preparations are fixed for fifteen to twenty minutes in absolute alcohol. One drop of the staining solution is added to 10 c.c. of distilled water, and the diluted stain used for ten to fifteen minutes. The spirochætes stain all the better if one to ten drops of a solution of 1 to 1000 carbonate of potash be first added to the 10 c.c. of distilled water with which the stain is mixed. The spirochætes colour well in fifteen minutes, and it is unnecessary to continue longer than an hour, as by that time the maximum of coloration is reached. In the same number (namely, June 29), Herxheimer and Hans Hubner state that they do not like Giemsa's stain, owing to its producing precipitates which may obscure the view of the spirochætes. They prepare their stain when using it, and find that a mixture of Nil and Capri blues is very suitable for staining the spirochætes. Herxheimer has succeeded in staining the parasites in a section of a syphilitic tissue (a papule taken from the skin of the back). In all but one of the cases examined, namely, seventeen in number, he found the parasites in both the primary and secondary lesions. He considers that a $\frac{1}{12}$ oil immersion is more suitable than a $\frac{1}{20}$ for seeing the parasites. Another paper, by Reichmann, appeared a week earlier, namely, June 22, in which he describes the following modifications preferred by him:—The thin films are placed for ten minutes in a large excess of absolute alcohol, then for five minutes in a solution of phosphoric acid (2 per cent. in distilled water), then washed in distilled water and in 70 per cent. alcohol, then washed again in distilled water. Now stain in hot carbol fuchsin until steam rises, wash in water, pass rapidly through 70 per cent. alcohol, wash in water, dry and mount. By this method the nuclei are dark, protoplasm is very little coloured, the serum is clear, and the spirochætes come out a clear red colour. In the third paper, published on the 22nd of July, M. Oppenheim and O. Sachs recommend drying in the air, no fixation, but staining at once with carbol gentian violet (concentrated alcohol solution gentian violet, 10 c.c.; 5 per cent. carbolic acid, 100 c.c.), heat until steam rises, wash in water, dry and mount. Preparations fixed in alcohol do not give such good results. The spirochætes come out blue. In the *Compt. rend. Soc. de biol.*, Paris, 1905, June 24, Proca and Vasilesen describe an easy method, namely, fixation with alcohol for thirty minutes, then a mixture of carbolic acid, tannin, and basic fuchsin, and then staining with gentian violet. This selection of papers on methods of staining will serve to show that the demonstration of the spirochætes is not a difficult matter, and that there is still much difference of opinion as to the best method. Ivo Bandi and Fr. Simonelli (*München. med. Wchnschr.*, No. 35, 1905, August 29) go even further, and state that Giemsa's method is not the best, and that they obtained the best results by means of the usual method for staining tubercle, namely, by first fixing in alcohol or with heat, and then staining for a

few seconds with hot carbol fuchsin. The cases examined by them were chiefly cases of secondary syphilis, and in several of them in the mucous patches about the mouth they found the *Spirochæte pallida* not only free but also contained within large pale cells, whose protoplasm was in some instances degenerated; in short, the appearance resembled the giant cells of tubercle and the large cells of leprosy and glanders, thus bringing syphilis fully into line with the specific granulomata. Paul Mulzen (*Berl. klin. Wchnschr.*, No. 36, 1905, September 4) examined a large number of cases of syphilis, and also of other diseases, in order to determine—(1) Does *Spirochæte pallida* occur fairly regularly in syphilitic lesions? (2) Does it occur in other diseases? (3) Can it always be distinguished from other spirochætes? He concludes that it is very constant in syphilitic lesions, that so far it has been found only in syphilis, and not in other diseases or in healthy persons (this is contrary to the statements of some observers, *e.g.*, Rona and Menge-Kronig, who found it in health, etc.); and lastly, that it can always be distinguished, provided the observer has sufficient skill and experience, from the larger parasitic spirochætes which may occur along with it, and which have no relation to syphilis. E. Hoffmann (*Berl. klin. Wchnschr.*, 1905, June 5) described the case of an infant dying of pemphigus one day after birth. He found the *Spirochæte pallida* in the bullæ of the pemphigus, in great numbers in the liver, and in fewer numbers in the spleen and inguinal glands. He also found them in the skin papules of secondary syphilis. Later, on 10th July, he communicated to the same journal that he had found spirochætes in ulcerating cancers of the skin. They could be distinguished from the *Spirochæte pallida* by their greater thickness, and the greater ease with which they took on stains. In the same number, v. Babes and J. Panea describe the case of an infant dying at the age of four weeks of congenital syphilis. The mother at the time of birth showed mucous patches and secondary eruptions on the skin. The infant showed general vascular degeneration, serous and hæmorrhagic inflammatory foci, and syphilitic pneumonia. Other two cases of congenital syphilis in infants which showed similar lesions were also examined. The spirilla were found in all the syphilitic lesions in the liver, spleen, bone marrow, lymphatic glands, lungs, and suprarenals, and also in the heart's blood. Control observations in infants dying of other diseases failed to find the same spirilla.

The Entrance of Ankylostome Larvæ by the Skin.

This method of injection was denied as late as 1903, but Cuthbert Christy stated at the Oxford Meeting of the British Medical Association in a note to the Tropical Section, that he had found it to occur. Schaudinn (*Deutsche med. Wchnschr.*, Leipzig, 1904, September 8) has demonstrated it experimentally in monkeys. By placing a few drops of a culture of ankylostomes on the skin of the back, he found thirty-six ankylostomes in various stages of development one and a half months thereafter in the intestine. In another experiment, nine days after the contact of the larvæ with the skin, he found the ankylostomes in the intestine. He says Loos possesses preparations demonstrating this, and

he corroborates his opinion, but he does not mention Christy, who was probably the first to show it. The larvæ pass by the veins of the skin to the right heart, then to the lung, and then to the œsophagus, stomach, and intestine. They are to be found in the blood and in the lungs.

The Transmission of Syphilis to Monkeys.

Neisser (*Deutsche med. Wchnschr.*, Leipzig, 1904, September 15) injected the serum of secondary syphilis into the chimpanzee without result either as to infection or protection from a subsequent infection. The serum of such animals does not contain enough antibodies for protection, but he thinks it possible that if an animal were injected with strong doses of the syphilitic virus its serum might be active and immunising. His experiments with macaques, with orangs, and with chimpanzees seem to support in some measure this suggestion. The most striking results of his experiments are the long duration of the period of incubation of syphilis in the monkey when inoculated by the method of scarification, and the character of the primary lesion; in the penis it produces a chronic œdema and in the glands a fibroid adenitis. The secretions of a syphilitic monkey cannot transmit the disease to other monkeys. The hyperkeratose erruption produced by inoculation is unknown in man.

Myelocytes in the Blood of Infants.

Zelenski and Cybulski (*Rev. méd. de la Suisse Rom.*, Genève, 1904, July) examined the blood in a number of cases, using Ehrlich's triacid stain. They found myelocytes in from 1 to 17 per cent. in eight cases of pernicious anæmia in infants. In six cases of prematurely born infants they were present in great numbers. They were also found in some cases of hereditary syphilis, and a few times in severe cases of rickets, and in scrofula and in phthisis. They conclude that myelocytes are present in the blood in all cases of chronic disease in infants, the number depending chiefly upon the age of the infants, being greater the younger they are up to two months.

Hepatic Cirrhosis a Disease of the Blood and Spleen.

Bleichröcler (*Virchow's Archiv*, 1904, Bd. clxxvii. S. 435) seeks to prove that hepatic cirrhosis (all the forms being varieties of the same disease) is a disease of the blood and the spleen. His arguments are as follows:—(1) The gastro-intestinal and splenic lesions of cirrhosis are not due to the congestion of the portal system, since they differ from those of heart disease and resemble those of leukæmia and pernicious anæmia. (2) In the majority of cases of cirrhosis, as in diseases of the blood, one finds in the urine volatile fatty acids with increase of ammonia, of urobiline, and of uric acid. The cirrhosis is therefore not a primary affection of the liver but results from alterations.

Blastomycetes in the Urine.

Vedeler (*Centralbl. f. Bakteriol. u. Parasitenk.*, Jena, 1905, January 25) sowed the fragments of a cancer of the uterus and of the ovary, as well as the fragments of a sarcoma, in a medium containing 3 grms. of crystallised pepsin in a 100 grms. of distilled water, and obtained in about ten to fourteen days a culture of blastomycetes of very various forms, which he figures in fifty-one pictures representing different stages in their development. Certain of these parasitic forms have been found in the urine of thirteen persons afflicted with cancer. As a control he examined the urine—first, of thirteen women not afflicted with cancer, and he failed to find blastomycetes in any; and second, of thirteen doctors believed to be free from cancer, and in two of them he found the parasites. One of the latter suffered from epilepsy, and the other had a case of cancer in his family. The author asks if this method may not detect, or aid in detecting, a cancer larva.

DISEASES OF THE EAR, NOSE, AND THROAT.

UNDER THE CHARGE OF

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The Treatment of Acute Middle Ear Inflammation.

The treatment of acute middle ear inflammation has recently received considerable attention from aurists. The last word has apparently not been said upon this subject, and unanimity does not exist regarding the methods that should be adopted in dealing with an acute otitis media. Some surgeons have been blamed because of too early surgical interference upon the mastoid process. The feeling appears to be gradually gaining ground that operation is frequently too long delayed, and that the cavity of the middle ear has not been treated along the same general surgical principles which are applied to acute suppurations in other parts of the body. There can be no doubt that chronic suppurative disease of the ear is to a large extent preventible, and if an acute infective process were treated more energetically at the outset and upon the recognised principles of surgery, much deafness might be prevented, and many lives would probably be saved.

The question of middle ear disease in relation to the exanthemata is one of great importance, and has been treated in a recent paper by A. R. Gordon of the Monsall Fever Hospital (*Med. Chron.*, Manchester, 1905, September). The writer has found that about 1800 cases of scarlet fever are treated in this hospital annually, and that of these about 20 per cent. suffer from suppuration in one or both ears. In

London about 12,000 are admitted to the hospitals of the Metropolitan Asylums Board, and of these 1700 have otorrhœa. Some interesting points are noted in connection with the pathology of these scarlet fever cases. Usually very rapid destruction of the tympanic membrane results, and the tympanum is filled with pus and granulation tissue. From the first, in the large majority of cases the discharge is profuse and very soon becomes fœtid. It is clear that, as a rule, infection of the mastoid antrum, and possibly also of the cells, is an early complication, and caries and necrosis of the bone are met with. It must be evident, therefore, that if the process is so acute and virulent, active treatment becomes imperative. The practice adopted by Dr. Gordon in the Monsall Hospital is along the following lines. The frequent presence of post-nasal adenoids with or without hypertrophy of the faucial tonsils being a predisposing cause of middle ear inflammations, he does not hesitate to remove the adenoids as early as possible, even in the acute stage of the faucial affection, if they are causing any retention of secretion in the naso-pharynx: otherwise the operation is done a week or a fortnight after the temperature has fallen to normal. The nasal douche is employed. Carious teeth are extracted in the acute stage of the disease, in order to reduce the oral sepsis.

When otitis has occurred, if the perforation in the membrane is a small one, it is either enlarged or a second one is made. When more thorough drainage is required, the mastoid antrum is opened and carious bone removed. More recently, however, the writer found that the results from the simple Schwartze procedure were not always satisfactory, either as regards the cure of the discharge or the condition of the hearing. For these reasons, he has adopted the more radical method of operating, performing the complete operation, removing the membrane, the malleus and incus, and thoroughly opening up the aditus and antrum along the recognised lines. Though the number of cases thus treated is not yet large, the writer is encouraged by his results, and is inclined to the view that the complete operation may ultimately turn out to be the best method of treating scarlatinal otorrhœas when they resist simpler measures. Moreover, that the operation should be performed at an early period of the illness, when the patient is still in the isolation hospital.

At the recent meeting of the British Medical Association held at Leicester, a discussion took place upon the "Lines of Treatment in preventing Acute Middle Ear Suppuration from becoming chronic." A paper was read by Dr. W. Milligan (*Journ. Laryngol.*, London, 1905, October). He propounded the question as to what constituted chronicity, and at what stage an acute process could be regarded as having become chronic. He was of the opinion that neither a time limit nor the evidence derived from pathological changes quite met the case, but that from the point of view of practical politics, a case might be considered to have passed into a stage of chronicity when the recognised treatment adopted for its relief as an acute condition had failed to modify the progress of the disease. Therefore everything depends upon the success of the treatment in the earliest stages of the disease. Expectant treatment awaits the rupture of the membrane, allows of a necrosis and ulceration of its layers, and the formation of a perforation often too

minute and inadequate for the maintenance of free drainage. Rational treatment anticipates what is the inevitable result of the existing pathological process, and comprises free incision of the membrane and the maintenance of adequate facilities for drainage. It is far better to perform one unnecessary paracentesis than to regret afterwards the presence of extensive destruction of the tympanic membrane and of the contents of the middle ear. The writer strongly condemns the use of Politzer inflation in the treatment of the infective condition, being of the opinion that in many cases it brings about an extension of the septic inflammation to the lining membrane of the antrum and mastoid cells.

The further question discussed by the writer deals with the indications for opening the mastoid antrum in cases of acute middle ear suppuration. He is of the opinion that in any given case where pain and profuse discharge exist after free paracentesis, and where, on bacteriological examination, the *Streptococcus pyogenes* is found, the best interests of the patient are served by immediate resort to the mastoid operation. Little reliance is to be placed upon the temperature in these cases, as in a great many of them the temperature is normal even where the mastoid process is greatly disorganised. An acceleration of the pulse, on the other hand, is of more value, as it is found as a rule to be accelerated. If drainage of the antrum through the mastoid process was more frequently practised at an earlier stage of the disease, much chronic suppuration of the middle ear would be avoided. Indeed, the writer goes so far as to say that if a given case has resisted free incision of the tympanic membrane and the maintenance of drainage for a period of three weeks, it is not only justifiable but essential to open the mastoid antrum.

The great majority, if not all, of the chronic cases of middle ear and mastoid disease have commenced in an acute inflammation. The important practical question is, how long are these cases to be regarded as belonging to the acute category? In other words, after what interval should the complete mastoid operation be performed, and not the so-called operation for the relief of acute disease? This question has been recently put by C. A. Ballance (*Lancet*, London, 1905, Sept. 30). The writer answers his question in the following way:—Many cases in which the operation for acute disease has been performed subsequently require the complete operation, and he is now of opinion that in any case requiring operation after six weeks of discharge, the surest treatment is the complete operation. The former is an incomplete procedure, and therefore uncertain in its results: the bridge is not divided, the abscess is incised only at its two extremities, the narrow neck of the antrum provides imperfect drainage, and is very liable to become blocked by granulations.

Anæsthesia of the Membrana Tympani and External Auditory Meatus by means of Chloride of Ethyl.

The painful nature of the operation of paracentesis of the tympanic membrane has led to the introduction of various applications for the

purpose of obtaining local anæsthesia. A very convenient and efficient means of producing this by freezing the part with ethyl chloride has been suggested by Schild (*Journ. Am. Med. Assoc.*, 1905, July 8). It has the advantage of being ready to hand, and can be quickly applied. Practical experience has proved that the process of freezing is not fraught with any danger to the ear, and that the patient does not complain of pain and discomfort in connection with its application. It should be stated that Brieger had already suggested the use of ethyl chloride for a similar purpose. Schild found in his earlier cases that the ordinary nozzle of the ethyl chloride tube did not prove very satisfactory, partly because of the difficulty in ascertaining whether the liquid actually fell upon the tympanic membrane, and partly because too much escaped from the tube. To obviate these difficulties, he has had a special nozzle constructed: this measures about 2 inches in length, is very slender, and is attached to the tube at such an angle as to permit of the deeper parts of the meatus being visible to the surgeon when the nozzle is partly introduced into the speculum. Further, the liquid passes out in the form of a very fine spray and not as a jet, as is the case in the ordinary apparatus. The fluid is first allowed to play upon the tympanic membrane in the form of an almost imperceptible spray, the patient experiencing a sense of coolness within the ear. The amount is then increased by opening the valve still further, and it is continued until an aching sensation is complained of. Rapid evaporation is encouraged by introducing air into the meatus by means of a Politzer's bag. Paracentesis may then be carried out, and Schild now uses this method as a routine practice. The operation on the drum is possible with little or no discomfort to the patient, and the subsequent course of the case seems to be in no way interfered with by such a procedure.

PUBLIC HEALTH.

UNDER THE CHARGE OF

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Bacteria in Railroad Cars.

Dr. J. J. Kinyoun (*Med. News*, N. Y., vol. lxxxvii. No. 5), in an interesting article on "The Bacterial Content of the Railway Coach," gives some interesting results of the bacteriological examination of—(1) The dust from the carpets, (2) the dust from the interior furnishings of the car, (3) the air of the car, and (4) the drinking cups in use in the car. The attempt to demonstrate the presence or absence of *Bacillus tuberculosis* was given a prominent place in the investigation. Seven samples of dust from the carpets were examined, and only a few pathogenic forms were found, namely, *Staphylococcus pyogenes aureus*,

pneumococcus, *Staphylococcus pyogenes*, and *B. coli communis*. The pneumococcus was only slightly pathogenic, and *B. tuberculosis* was never found. Thirty-four railway coaches were examined as to the bacterial content of the dust from their interior surfaces—twenty-nine sleeping cars, three day cars, and two smoking cars. "Eleven of the cars were running to health resorts and places frequented by tuberculous patients," and were examined, "when, to the writer's personal knowledge, many cases of undoubted tuberculosis were occupying them." The samples were collected from the surfaces of seats, bedding, curtains, and woodwork by means of cotton-wool swabs, moistened with a 5 per cent. glycerin solution, placed in a large test tube and sterilised just before use. Not less than 15 square ft. of surface was in each case rubbed over by a swab. Each swab after use was placed in a flask containing 100 c.c. of sterile distilled water, and soaked there for several hours, the water expressed and the suspension centrifuged, the sediment being used for microscopical examination and for animal inoculation. Sixty-four animals were inoculated from these specimens, and only in one instance was *B. tuberculosis* positively identified. Pneumococcus was found in five instances, *Streptococcus pyogenes* in two, *Staphylococcus pyogenes aureus* in two, *B. coli* in two, septicæmia in six, malignant œdema in one, and *B. diphtheriæ* in one instance.

As regards the bacteria in the air of the coach, the results are of special interest. In all, the air of forty-eight coaches was examined, the amount aspirated varying from 1500 to 7200 cubic ft. The dust from the air was aspirated while the cars were in motion, by means of a special apparatus, the dust and bacteria being caught on sterilised glass wool contained in metal cylinders. This glass wool was subsequently washed in sterilised water, and the watery suspension centrifuged for five minutes to remove the larger particles, and then again centrifuged to sediment the finer particles for microscopical examination, and for plate cultivation and animal inoculation. Microscopical examination of the sediment showed particles of coal, sand, vegetable fibre, wool, epithelial and pus cells, yeasts, bacilli, and cocci. Plate cultivation showed the number of bacteria to vary from 225 to 5200 per cubic ft., and their number appeared to have no relation to the amount of dust or the number of passengers. The colonies which developed were yeasts, moulds, sarcinæ, cocci, and bacilli. The majority of the micro-organisms were those of outside air, but pneumococcus, *Staphylococcus pyogenes aureus*, *B. coli*, and the bacillus of septicæmia were also isolated. Ninety-six animal inoculations were also made from the dust so aspirated, with the following results:—Tuberculosis, one; pneumococcal infection, eight; staphylococcal infection, four; general septicæmia, five; malignant œdema, one; and *negative*, seventy-six. The greatest number of pneumococcal infections from the air was obtained in smoking cars, the air from the day coaches being in all instances negative.

Twenty-one specimens obtained from the drinking cup of the Pullman car were examined, and the presence of pneumococcus was demonstrated in one instance; streptococcus in one; *S. pyogenes aureus* in one; and diphtheria bacillus in one. The pyogenic organisms were non-virulent and the pneumococcus only slightly virulent, but the *B. diphtheriæ*

caused the death of a 300 gram. guinea-pig in less than four days. The following table shows the results of the animal experiments :—

	Carpet Dust.	Surface Swabs.	Air of Car.	Drinking Cup.
Negative	8	43	76	17
Pneumococcus	2	5	8	1
Staphylococcus pyogenes aureus	3	2	4	1
Streptococcus pyogenes	...	2	1	1
B. tuberculosis	...	1	1	...
Streptothrix	...	1	...	...
Colon infection	...	2	...	...
Diphtheria	...	1	...	1
Septicæmia	1	6	5	...
Malignant œdema	...	1	1	...
	14	64	96	21

Dr. Kinyoun states that he has no desire to draw any hard and fast conclusions from his experiments, and that "the only fact which seems to have been proven in this investigation is that 73 per cent. of the animals inoculated gave negative results, demonstrating that the bacterial content of the railway coach in the majority of instances examined was not infectious to animals."

Diphtheria.

In the course of a paper on diphtheria (*Pub. Health*, London, vol. xvii. No. 2), Dr. Renney, Medical Officer of Health for Sunderland, gives the history of two outbreaks of that disease, which tends to show that the possible source of infection was the dust from floors, walls, etc. In Sunderland, during the last ten years the average notifications of diphtheria has been 48·6 per annum, but in the first quarter of the year (1905) fifty-five cases were notified. On investigation, it was found that most of the children attended the Council Schools, nine of the cases having occurred in children from one classroom of the infant department of one of the schools. On 21st March disinfection by formalin vapour and formalin spraying was carried out in this department, and there had only been one other case notified in the department up to 12th May. As that case was notified on 24th March, it had probably been infected prior to disinfection of the department. It had been intended to take swabs from the dust of the floor and from the top of the door prior to disinfection, but disinfection had been performed before the medical officer knew of it. Swabs taken from these situations after disinfection gave negative results. Dr. Renney does not "assume that the source of infection was to be found only on the floors, walls, and desks of this classroom," but thinks "it is a very significant fact that since 21st March there has not been another case there."

On 25th November 1904 a boy was admitted to Sunderland Borough Sanatorium suffering from scarlet fever. He had, however, in addition, a very suspicious throat, and 2000 units of diphtheria antitoxin were

administered, and he was placed for observation in a pavilion by himself. Swabs from his throat showed the presence of the diphtheria bacillus. He made a good recovery, and a month later, as he was still peeling, he was returned to the scarlet fever pavilion, which had just been thoroughly disinfected. On 22nd January 1905, a nurse, who had been working in the male ward of this pavilion, developed diphtheria. She was removed to the isolation block, and disinfection was again carried out. On 31st January, a boy, who had been admitted into the scarlet fever pavilion on 22nd December (after the pavilion had been disinfected), developed diphtheria. He also was removed, and disinfection of the pavilion was again carried out. On 6th February the diphtheria bacillus was found in the healthy throat of a child in the ward, but no further development then took place. On 24th March diphtheria occurred in another scarlet fever patient admitted on 9th March. He was removed, and the pavilion emptied of the other patients. Swabs were taken from the dust on the top of the door, and also from the crevices in the floor, and diphtheria bacillus was found in both instances. Swabs taken from these positions after thorough disinfection of the pavilion with formalin gave negative results.

Dr. Renney has no doubt from his experience that a certain percentage of scarlet fever patients have diphtheria bacillus present in the throat on admission, and although most of them do not develop diphtheria, they yet act as "carriers" to others. He thinks it "a matter for serious consideration whether all scarlet fever patients should not first be admitted into an observation pavilion, where swabs could be taken, and the patient detained until the swabs showed a negative result; they could then be sent to the scarlet fever pavilion."

The Influence of Privy-Middens and Water-Closets on Diarrhœa and Typhoid Fever.

Dr. Martin, Medical Officer of Health, Gorton (*ibid.*), in dealing with this subject, gives some interesting statistics regarding the comparative

Year.	Population.	Number of Privies.	Number of Water-Closets.	Typhoid Notifications.				Diarrhœa Deaths.			
				Number of Cases in		Rate per 1000.		In Privy Houses.	In Water-Closet Houses.	Rate per 1000.	
				Privy Houses.	Water-Closet Houses.	Privy Houses.	Water-Closet Houses.			Privy Houses.	Water-Closet Houses.
1901	27,000	4050	1350	84	5	19·5	3·7	86	3	21·2	2·2
1902	27,500	4000	1800	29	4	7·2	2·2	26	6	6·5	3·3
1903	28,500	4000	2200	31	5	7·7	2·2	44	4	11·0	1·8
1904	30,000	3900	2500	23	4	5·8	1·6	34	9	8·7	3·6
Average of four years . . .						10·0	2·4			11·8	2·7

prevalence of diarrhœa and typhoid fever in houses provided with proper water-closet accommodation, and in those which have only privy-middens. From the statistics which are embodied in the accompanying table, it is evident that there is a very special incidence both of diarrhœal deaths and typhoid notifications in houses where privy-middens are in use.

Dr. Renney states that the difference in favour of water-closets is very much greater than is indicated by the above figures in his district, as many of the water-closet houses are "back to back," and surrounded by privy-midden houses. Some hundreds of the water-closet houses are also situated very close to night-soil tips.

As regards epidemic diarrhœa, he considers "the principal factors in the production of the disease are two, namely, privy-middens and flies, the latter conveying the germs from the privy-middens on to food, which is almost exclusively cows' milk"; and he states that "a very great difference is observed in the number of flies is these rows of houses supplied with water-closets and dry ashbins as compared with privy-midden houses." In one instance during summer a privy-midden was examined at the house of a typhoid case. The flies were "hanging in bunches, and wading in and sucking up the liquid excreta, flying directly into the kitchen, into milk vessels and on to food exposed on the table." He considers there is little chance of the infantile mortality rate, which is so greatly augmented by the annual epidemic of diarrhœa, being permanently lowered in privy-midden districts until the filthy arrangement of the privy-midden is replaced by the water-closet system and dry ashbins.

Spread of Tuberculosis by Sausage Meat.

The researches of Tonzig (*Gazz. degli Ospedali et delle Cliniche*, 1904, No. 154), undertaken to determine whether sausages made in the ordinary manner from tuberculous meat could transmit tuberculosis, and if the virulence of the *B. tuberculosis* was diminished under the action of the constituents of the sausages during keeping, are of considerable interest. Sausages were made for the purpose in the laboratory, being made in the manner usually adopted by pork butchers. They were made from tuberculous meat mixed with pork, and having added to them portions of the viscera affected with tubercle. After making, they were preserved in the ordinary way by hanging them in an airy, well-ventilated position. Portions of the sausage meat were inoculated under the skin of guinea-pigs from time to time after the second month, when the drying was complete. The experiments showed that the sausage meat infected with tubercle and preserved in this way can produce experimental tuberculosis in inoculated animals, and that the virulence of the bacilli can be retained for as long as six months after the preparation of the sausages.

REPORTS OF THE MEDICAL SOCIETIES.

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Glasgow Pathological and Clinical Society.—*October* 9, 1905.—The President, Professor Muir, in the chair.—Dr. A. N. M'Gregor showed a fibroid uterus removed by Dr. Adams.—Dr. J. H. Teacher showed an enlarged heart with atheromatous aorta, thickening of the aortic curtains, and complete obliteration of the pericardium. In the same case there was also present a healed localised empyema.—Dr. A. N. M'Gregor showed a baby from whom he had removed a large teratoma of the neck, when the child was 3 weeks old. Dr. Charles Workman demonstrated the tumour and microscopical preparations. The tumour was present at birth, and was situated on the left side of the neck, extending from the middle line in front to the sterno-mastoid muscle posteriorly, and reaching from about the level of the clavicle upwards to the middle of the cheek. The operation presented difficulty on account of the tumour interfering with respiration in certain positions, and this was one of the reasons which determined its removal. It had no connection with the thyroid gland. The tumour presented appearances of a mixed character, a cystic portion composed of one large and several smaller cysts lined by columnar epithelium, and somewhat resembling the structure of the thyroid, and a solid portion of the nature of a round-celled sarcoma. Parts of the solid portion were highly vascular, and contained cartilage. The tumour was regarded as a branchial anomaly, although the possibility of its relationship to an accessory thyroid was also entertained.—Dr. Walker Downie showed two patients on whom he had successfully operated for branchial fistula.—Mr. Henry E. Clark showed a large kidney, which he had removed on account of calculous pyonephrosis, and plaster casts and skiagraphs of an unusual case of multiple digits. The case suggested an indication of the presence of the elements of another hand.—Dr. R. T. Wells read notes of a case of malaria, and exhibited microscopical preparations of the blood, showing the presence of the parasites.

Forfarshire Medical Association, *October* 6, 1905.—Dr. Sinclair, the President, introduced Professor A. R. Simpson, who delivered the Inaugural Address for the ensuing session. The subject of the address was Criminal Abortion, as studied from an ethical point of view. He considered it one well worthy of attention by medical practitioners, for the crime of procuring abortion was too common, and the suspicion of its occurrence gave rise to delicate and difficult inquiries. He said that abortion might be regarded as a crime against the State in that it was an infraction of special statutes, but also opposed to the object and intention of marriage, which was the legal institution for propagation of the race. It implied danger to the health and life of the mother, and above all it implied destruction of life, be it infant, fœtus, or embryo.

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EDITORIAL.

The Prevention of Senility.

It has been the task of the theologian to reconcile men to death, and of the philosopher to discourse of the reasons for its necessity; but in all ages the hankering desire of mankind for immortality has instigated the scientist (magician, alchemist, or physiologist) to the quest for the *elixir vitæ*. The latest contributor to this subject is Sir James Crichton Browne, in a charming little volume.[1] He contributes little that is new, he writes delightful platitudes in a style which is wholly his own, and he tantalisingly avoids grappling with those obscure points upon which an unregenerate and material generation desires above all things to be informed. But he strikes an attractive note when he pleads, not for the indefinite prolongation of human life, which is impossible, and undesirable if it were possible, but for a smooth, uncomplicated, normal senility, during which the lamp of life shall gradually dwindle and quietly go out for want of oil at the ripe age of 100 or 120 years. The path indicated to this desirable end is not too closely surveyed, nor are the directions given in detail; the advice tendered is as old as humanity, but it never on that account seems to grow less convincing or more acceptable. Neither in the quest of the *elixir vitæ* nor of the philosopher's stone, but in the quest of the Holy Grail, lies the secret. Temperance, diligence, piety comprise the rules. Whether these are to be the last as they were the first words on the subject, it is difficult to say. Metchnikoff believes firmly that the intestinal flora and the normal phagocytes are agents which prematurely shorten the span of human existence, and he would have us amputate the large intestine and drink sour milk to destroy the former, and saturate our systems with specialised serums to overcome the latter. If, as Allchin holds, nutrition and life are the resultants of causal ferments or enzymes, then the environment of living organisms may be artificially so adjusted that life may be prolonged and death averted. Unfortunately for these

[1] "The Prevention of Senility." London: Macmillan & Co. Ltd.

two theories, humanity, as it grows older and more observant, becomes also more wary, and is not to be caught by theories, however enticing. It has begun to realise, as a result of its long struggle with nature, that death is not its worst enemy, but disease—disease and poverty and bad sanitation of the mind and body—which interferes with its thinking and working powers. The fear of death has been, and still is, a stimulus, but the great object, often lost sight of, is the equal chance of health and strength to all men, so that humanity may the more quickly achieve its destiny. Those who prate glibly of prolonging human life to a hundred years forget the enormous weight it is proposed to lift. The obstacles against raising the mean duration of human life at all—beyond what may be indirectly attained by checking infant mortality—can only be realised by those who are conversant with the intricate problems of heredity on the one hand, and with the pitfalls which beset that portion of humanity who have passed the reproductive period of life on the other hand. To aim at raising the mean duration of human life by a few short years may be a prosaic object, but it is more sane and practical than to perorate extravagantly of semi-magical routes to the unattainable age of a hundred years.

Australian Medical Congress.

We are not greatly enamoured with congresses, which nowadays are held on every conceivable subject, and with almost wearisome frequency. In this country the annual touting which goes on on behalf of certain bodies to secure the attendance of delegates from town councils and public, as well as private, institutions of almost every description, has become a perfect nuisance. Under the somewhat threadbare cloak of science and the public welfare, high-sounding names are obtained as patrons, and hospitality is begged from all and sundry for the members and delegates, until these frequent so-called congresses are regarded by the majority of people as things to be avoided.

None of these remarks can be applied to the Australian Medical Congress, which meets only at intervals of three years, and serves a most useful and necessary purpose, in bringing together men who live thousands of miles apart on that great continent, and are not, as in this country, within a few hours' journey of each other, at the furthest, all the year round.

This year's meeting was held in September at Adelaide, under the presidency of Dr. E. C. Stirling, Professor of Physiology in Adelaide University, who gave a really eloquent address on "Medical Science and Social Problems." It is well worthy of a wider circulation than it is likely to obtain. We will only quote one paragraph on a subject which deeply affects ourselves as well as Australasia.

In speaking of the declining birth-rate, he says: "Correlative with the question of physical deterioration is the ugly fact, for some time suspected and recently confirmed by the report of a Royal Commission in a neighbouring colony, that the decline in the birth-rate, which we have been accustomed to think of as a feature only of those older countries which have had to face the problems of over-population, has extended to these sparsely peopled States, and that all classes are affected, even those who have not the burden of want to offer as an excuse. Thus, one of the conspicuous signs of national decadence is beginning to affect us while we are still a nation in the making. And the causes at work, clear and distinct, and for the most part disreputable, bring with them the uncomfortable idea of a concomitant general loosening of moral fibre which will inevitably radiate its malign influence in other directions. Here, at least, is a field in which that democratic panacea, compulsory enactment, is powerless."

Amongst sectional papers, especially interesting was the address of the President of the Section of Medicine, Dr. Colquhoun of Dunedin, on "The Standard of Ethics and Work in Medicine," and that of Professor Welsh of Sydney, President of the Section of Pathology, on "Recent Observations on Cancer and Tumour Growth."

Amongst the resolutions carried, one in the Eye Section, reported by Dr. Lockhart Gibson to the final general meeting, is of considerable general interest, namely, "that permanent blindness from lead poisoning among young children in Queensland has been recognised; that it is highly probable that paint used on verandah railings, etc., especially when exposed to weather influences, is the source of the poison."

Consultations for Infants.

THIS title, or, as Dr. Dufour of Fécamp has termed a similar organisation, "Goutte de lait," does not convey to either the lay or medical mind in this country the true significance of a great and important work which is being carried out in Paris and in many districts of France.

More than twelve years ago—in 1892, as a matter of fact—Budin, when he was at the head of the Maternity in the Charité Hospital, was so impressed with the great and largely preventible mortality amongst infants after they left his care in the Maternity, that he obtained official authority to form the first "Consultation for Infants." In a word, the consultations are destined to induce women who have been delivered in the Maternity to return to an out-patient department, so that their babies may be watched and the feeding directed. No one who has had any experience amongst the poorer classes in our large towns will deny that one of the most distressing problems of the present day is the

enormous infant mortality, and the gross ignorance, if not callousness, which is displayed by many mothers in the rearing of their babies. We have heard in the last two or three years a great deal about this subject, and many towns, in an attempt to grapple with it, have instituted depôts for the provision of sterilised or pasteurised milk. These have met with some success, it must be admitted; but opinion is by no means unanimous in regard either to the benefits they claim to confer, or to the methods by which they are administered. The cause of this lies, in our opinion, in the absence of proper organisation for reaching mothers immediately after their confinement or discharge from maternity hospitals, and also in the fact that the milk is not distributed under the direct supervision and advice of a medical man.

"Consultations for infants" are open to neither of these defects. The mother is induced to bring her infant as soon as possible after birth. She receives a card on which is inscribed the weight and other particulars in regard to it. At each visit—weekly or fortnightly—the infant is undressed, weighed, and the mother passes before a doctor, who examines the baby, encourages the mother to continue giving the breast, and offers any necessary advice. When the mother has not enough milk, mixed feeding is advised, that is, sterilised milk in addition to the breast, or, if necessary, a diet consisting entirely of sterilised milk. The sterilised milk is prepared by the institution, and the quantities prescribed are entered in a register and on the card which the mother keeps.

It is generally recognised that only such organisations as have at their head a doctor to follow the infants in their regular development and help mothers with his advice, can be considered of real utility. To create a consultation for infants, only three things besides the required accommodation are necessary: a pair of scales, an apparatus for sterilising milk, and the devotion of a doctor. The results of such an organisation as we have referred to mean, as statistics in Paris prove, an enormous saving of infant life, through the practical abolition of digestive ailments and that scourge of infancy, diarrhœa. This is an end worthy of the best efforts of every member of the public, but we feel convinced that it is to be attained, not by the mere provision of a pure milk, whether sterilised or not, but by the institution of consultations under strict medical supervision. To those who are interested in the question, and who desire further information, we recommend the perusal of a paper by Dr. Leonard Robinson of Paris, which appeared recently in the *Practitioner*, and which cannot fail to carry conviction to the minds of the sceptical.

ORIGINAL COMMUNICATIONS.

THE CLINICAL AND PATHOLOGICAL IMPORTANCE OF CHRONIC PANCREATITIS.[1]

By A. W. Mayo Robson, D.Sc., F.R.C.S.

Mr. President,—When you were so kind as to invite me to give the opening address of the 158th session of this distinguished Society, I ventured to hope that you would excuse me for departing from the accustomed general dissertation, as I thought I could select a subject more worthy of the occasion. If, however, my attempt should fall short of my wishes and of your expectations, I beg beforehand to crave your forgiveness for my shortcomings. My reason for selecting chronic inflammations of the pancreas as the subject of my address is, first, because I think they occur very much more frequently than is generally recognised; secondly, that clinically and pathologically they are as interesting as they are important; and thirdly, that, by an early recognition of these diseases and their treatment, further troubles may be averted which would otherwise tend to prolonged suffering, and frequently to a fatal termination.

However interesting it might be, the time at my disposal will not permit of my discussing the subject of acute pancreatitis in its varied forms, nor even the subacute variety. I propose, therefore, to limit my remarks entirely to the chronic, catarrhal, and interstitial forms of the disease.

In a lecture delivered at the London Medical Graduates College and Polyclinic in July 1900, I drew attention to chronic pancreatitis as a clinical entity, and expressed an opinion that, although it had hitherto been scarcely, if at all, recognised, except as a pathological curiosity, it was not an uncommon disease. In the five years that have elapsed since I made that statement, further experience has still more conclusively demonstrated the frequency with which the disease occurs, and how rarely its presence is recognised in clinical practice. Chronic inflammation of the kidneys, liver, and other organs give rise to symptoms which are described in every text-book; but the no less important and characteristic signs of chronic pancreatitis are, even in the most recent medical and surgical works, entirely omitted, or awarded but scanty and inadequate notice. It is true that the relation of the pancreas to diabetes is now generally recognised, but to wait until glycosuria supervenes before making a diagnosis is, as I hope to show later, to throw away the patient's only opportunity of cure—an opportunity which, if taken sufficiently early, will in nearly all cases restore him to perfect health, and save him a lingering and fatal illness.

[1] An Address delivered before the Royal Medical Society of Edinburgh.

There appears to be a general belief in the profession that the symptoms of chronic pancreatitis are so overshadowed by those of other morbid states from which it may arise, or with which it may be associated, that it can rarely be recognised during life as a clinical entity, and that even then it is usually only revealed at operation undertaken for the removal of gall stones. Opie, in his work on diseases of the pancreas (p. 163), states that "the lesion is seldom associated with such definite symptoms as to be recognisable during life, and that even at autopsy the condition is frequently overlooked." The former part of this statement does not, I think, hold good at the present day; for I am convinced that, from the information obtained by a careful examination of the patient, a knowledge of the history of the case, and the results of a chemical and microscopical examination of the excreta, a correct opinion may be formed in a large majority of instances. With the latter part of Opie's statement, however, I am in entire agreement. As evidence of the difficulty that even skilled pathologists have experienced in recognising pancreatic disease by naked-eye examination alone, one need only compare the statistics compiled by Hale White from the Guy's Hospital post-mortem records for the fourteen years 1884–1897,[1] and the results of the microscopical examination of the pancreas in a series of consecutive cases by Bosanquet.[2] By the morbid anatomists at Guy's Hospital the pancreas was regarded as diseased or injured in 142 of the 6708 bodies examined (*i.e.* in about 2 per cent.). Of these, forty-five, or under 0·7 per cent., were described as cirrhotic and hard, or small and atrophied. Bosanquet, as the result of his histological investigations, found that a certain amount of fibrosis is not uncommon, as it occurs in some 15 per cent. of patients dying from all causes in hospital. Now allowing, as Bosanquet suggests, that a certain degree of fibrosis is the usual accompaniment of old age, and that 10 per cent. may be excluded on that score, it still leaves 5 per cent. of cases in which some change was present microscopically, as compared with under 0·7 in the Guy's Hospital Reports, which were regarded as hard and cirrhotic macroscopically. It is obvious, therefore, that for the present it is impossible to rely on post-mortem records, either ancient or even recent, for precise information as to the frequency with which chronic inflammation of the pancreas occurs, and I quite agree that, "unless a microscopical examination of the pancreas is made, it is frequently impossible to say in any case whether it is normal or not, since in many instances the external appearances of the gland may be almost unchanged in the presence of considerable alteration in its anatomy" (Bosanquet).

The surgeon has considerable advantages over the pathologist in this respect, for he has the opportunity of examining and

[1] *Guy's Hosp. Rep.*, London, vol. liv. p. 17.
[2] *Lancet*, London, 1905, vol. i. p. 977.

handling the living pancreas, and after some experience he can generally tell the difference between the feel of the normal and diseased gland. A chronically inflamed pancreas is generally swollen and harder than usual. A typical case conveys to the examining hand the impression of a hard waxen cast. This may be recognised as a general swelling of the whole gland, or as a limited swelling involving the head and body of the gland. The swelling and hardness, especially in the early stages of catarrhal inflammation, are, no doubt, due to engorgement of the gland with blood and retained secretion; but as in many cases this will largely disappear after death, the difference noticed in biopsies and autopsies is easily explained. The lobules of the gland have the feeling of being mapped out and differentiated in a manner very different from their state in the ordinary healthy organ. The irregularity and change of consistency is occasionally so marked, that, to the inexperienced, it may suggest malignant disease. In fact, in some of the earlier cases of chronic pancreatitis on which I operated, this was the idea that suggested itself to me on examining the pancreas during operation, and it was only the subsequent uneventful recovery of a number of these patients, followed by an immunity from any further symptoms of disease—an immunity which in some instances has now extended to a considerable number of years—that confirmed my suspicions of the condition being purely inflammatory. My first case occurred in 1890, and the patient, a woman æt. 44, is now well, fifteen years later. Since my third case in 1892, which was confirmed by autopsy and by a microscopic examination, I have had the opportunity of examining the pancreas in a very large number of cases during operations in the upper abdomen, and in many of these there was little doubt that disease of this organ contributed to, or was the cause of, the symptoms complained of. The marked, and in many cases striking, relief that followed appropriate operative interference, conclusively demonstrated the importance of the condition; and I can point to a large number of patients, now in perfect health, who before operation were extremely ill, and in many cases supposed to be suffering from malignant disease of the pancreas, or from other ailments, such as pernicious anæmia, chronic catarrh of the bile ducts, cirrhosis of the liver, cancer of the common bile duct or of the papilla, cancer of the liver, common duct cholelithiasis, malaria, and other diseases.

The number of cases of chronic pancreatitis reported in the journals since I first called attention to the subject in 1900, shows that others are now recognising the condition, and that, where suitable treatment has been adopted, satisfactory results have followed.

The structure and functions of the pancreas are much more complicated than those of the parotid and other salivary glands, to which it bears some resemblance. Histologically, in addition

to the ordinary secreting parenchyma, with its ducts, there are the centro-acinar cells, and those peculiar structures known as secondary cell groups, interalveolar cell islets, interacinar islands or islands of Langerhans. The parenchyma of the gland is mapped out by clefts filled by loose connective tissue into lobes 1 cm. or more across. These are further subdivided by less well-defined bands of areolar tissue into lobules, and microscopically it is found that they are again divided by ill-defined septa into still smaller lobules. The connective tissue forming the septa is less compact than in the salivary glands, so that normally the pancreas is looser and softer in texture—a fact which is not sufficiently borne in mind when considering its morbid anatomy. The functions of the pancreas are now known to be much more complex than was formerly supposed, for not only does it secrete the pancreatic juice, which plays a most important part in the digestion of all food materials, but it is intimately related to the general metabolic phenomena of the body, and particularly to carbohydrate metabolism.

Pathological changes in the pancreas may originate in any of its constituent parts, and according to the structures primarily affected and the nature of the change will the effects on its anatomy and functions vary. For example, inflammation starting in the ducts is at first of a catarrhal nature analogous to cholangitis, with which indeed it is frequently associated. If the infective catarrhal condition is acute in character, it may go on to diffuse suppurative catarrh or to a localised suppuration ending in abscess; or if the infection be less virulent, it may not assume the more immediately dangerous suppurative form, but a chronic inflammation may extend to the parenchyma of the gland, leading to an increase of the connective tissue, eventually resulting in a condition resembling that seen in cirrhosis of the liver. Again, an increase of fibrous tissue may occur primarily around the blood vessels as the result of changes in them or their contents, and give rise to a cirrhotic condition of the gland. In some instances it is probable that as a result of toxic substances circulating in the blood the islands of Langerhans become first affected, as in amyloid disease of the gland.

The results of chronic inflammation of the pancreas as seen on the post-mortem table and following experiments on animals, may be divided histologically into—(1) Chronic interstitial interlobular pancreatitis. (2) Chronic interstitial interacinar pancreatitis. (3) Cirrhosis of the pancreas.

In the interlobular form of chronic interstitial pancreatitis, the normal loose connective tissue between the lobules of the gland is converted into dense sclerotic material, the glandular tissue is compressed and replaced from the periphery of the lobule by newly formed connective tissue, the normally obscure lobules becoming distinctly defined.

In the interacinar variety a diffuse network of irregular fibrous tissue is found separating the glandular acini, and in some instances penetrating between the individual cells, while the interlobular tissue is comparatively little affected. The gland is tough rather than hard, and the nodular character seen in the interlobular form is lacking.

Cirrhosis of the pancreas is the final stage of either interlobular or interacinar pancreatitis, but it more commonly occurs as a result of chronic interlobular inflammation, of which glycosuria is a rare sequel, not occurring until the lesion has so far advanced that the glandular acini are almost completely destroyed, and the vascular supply of the islands of Langerhans is seriously interfered with by the pressure of the newly formed fibrous tissue. In the interacinar form, on the other hand, the cell islands are involved at a very early stage, diabetes quickly supervenes, and it may prove fatal before the cirrhosis has become very marked. A new formation of fibrous tissue in the pancreas appears to be a comparatively late result of chronic inflammation, and unless this fact is borne in mind a very incomplete conception of the condition is liable to be formed.

Experimental ligature of the ducts in animals has shown that inflammatory atrophy and degeneration of the secreting parenchyma precede and accompany the formation of the new fibrous tissue which takes place, and in chronic pancreatitis due to obstruction of the common duct in man the sequence of events is no doubt the same. In the early stages the organ will be engorged with blood and retained secretion, the parenchyma will show cloudy swelling and other degenerative changes, there will be some leucocyte infiltration, and the ducts will be dilated; but although such an organ may during life be distinctly enlarged and hardened, after death it may appear to be normal or nearly normal to the naked eye, and even microscopically will show no increase of fibrous tissue. I was, fortunately, able to secure a microphotograph in a case where death occurred in an aged patient twelve hours after operation, apparently from a cerebral attack that came on during anæsthesia, where a gall stone was impacted in the common duct and was pressing on the pancreatic duct, the pancreas being found swollen at the time of operation. The presence of an inflammatory lesion of the pancreas was proved by a well-marked pancreatic urinary reaction before operation. At the necropsy no gross lesion of the pancreas could be seen, but microscopical preparations showed marked lesions in the shape of small-celled infiltration, congested vessels, and cloudy swelling of the gland cells, and I suspect that careful investigation would demonstrate similar microscopic lesions in many other cases where no gross changes are manifest.

I have already referred to the fact that obstruction of the pancreatic duct with damming back and infection of the secretion

gives rise to chronic pancreatitis. In practice this is by far the most common cause of the disease, and it is found to be due in most cases to the lodgment of a gall stone in the lower portion of the common bile duct.

The association of chronic pancreatitis with gall stones was absolutely forced on my mind by the frequency with which I found inflammatory enlargement of the head of the pancreas when operating for gall stones in the common duct.

The reason for the association of the two conditions is obvious when the anatomy of the parts is considered. The common bile duct, starting by the junction of the cystic duct and hepatic duct, courses along the free border of the lesser omentum associated with the portal vein and hepatic artery, it then passes behind the first portion of the duodenum, and soon comes into relation with the pancreas, which it either grooves deeply or passes through or behind, before it pierces the wall of the second part of the duodenum, where it empties into the diverticulum of Vater along with the duct of Wirsung. It may be divided into four portions—(*a*) The supraduodenal portion. (*b*) The retroduodenal portion. (*c*) The pancreatic portion. (*d*) The intraparietal portion.

The supraduodenal and the retroduodenal sections of the duct are unimportant for our present purpose, but the relations of the pancreatic and the intraparietal portion of the duct require careful consideration.

The fourth or intraparietal segment of the common duct comprises all that portion of the canal contained in the thickness of the wall of the duodenum. It passes obliquely through the muscular coat of the intestine, and then dilates into a little reservoir underneath the mucous membrane into which the main pancreatic duct also opens. This is known as the ampulla of Vater. This ampulla, a little oval cavity, may well be seen in a section of the wall of the duodenum in the axis of the common duct. The opening of the common duct is above that of the pancreatic duct, and the two are separated by a little transverse fold of mucous membrane. The ampulla measures from zero to 11 mm. in length, the average being 3·9 mm., and from 4 to 5 in breadth, and with the termination of the two ducts is surrounded by a thin layer of unstriped muscular tissue, forming a sphincter.

The ampulla opens into the duodenum by a little round or elliptical orifice, which is the narrowest part of the bile channel. Viewed from the interior of the duodenum, the ampulla forms a rounded eminence of the mucous membrane, known as the caruncula major of Santorini, the opening being seen at the apex of the caruncle. It is distant 8 to 12 cms. from the pylorus. Above it there is constantly found a small fold of mucous membrane, which must be raised in order that the caruncle and its orifice may be clearly seen. Running downwards from the caruncle is a small vertical fold of mucous membrane, known as

the frænum caruncularæ. Above the caruncula major is found a smaller eminence, the caruncula minor, marking the termination of the accessory pancreatic duct, or duct of Santorini, which opens into the duodenum about three-quarters of an inch above the biliary papilla.

The mode of formation of the ampulla of Vater and the termination of the common and pancreatic ducts are liable to at least five variations.

The first type is the classical one, which is described above. In the second type the pancreatic duct joins the common duct some little distance from the duodenum, the ampulla of Vater is absent, and the duct opens into the duodenum by a small flat, oval orifice. In the third type the two ducts open into a small fossa in the wall of the duodenum, while the caruncle and the ampulla of Vater are absent.

In the fourth type the caruncle is well developed, but the ampulla is absent, the two ducts opening side by side at the apex of the caruncle.

In the fifth type, the common bile duct opens along with the duct of Santorini, and Wirsung's duct enters the duodenum separately.

It will be readily understood that, under ordinary circumstances, when a gall stone passes along the common duct and reaches the ampulla of Vater, it will not only occlude the bile passages, but also the chief excretory duct of the pancreas, the secretion of which will be retained. If the ampulla is large, it may make a through channel for the bile into the pancreatic duct, or give rise to acute infection. Should infection occur, pancreatitis becomes inevitable; and on the condition of the individual, as well as on the nature of the infection, will depend what occurs, whether a mild catarrh of the pancreatic ducts, an interstitial pancreatitis, an extremely serious suppurative catarrh, or a parenchymatous inflammation in the shape of acute pancreatitis.

It will be seen that, while the normal termination and the second variety of termination of the ducts will favour the onset of pancreatitis in case of common duct cholelithiasis, the variations 3 and 4, in which the two ducts are separate, will possibly save the patient from the serious secondary pancreatic troubles, and in variation 5 a small portion of the gland only will become infected.

But the pancreatic ducts themselves are also subject to great variations that may influence the course of events. The beautifully dissected specimen in the Hunterian Museum, and an X-ray photograph of Wirsung's duct injected with mercury, demonstrate the normal anatomy of the pancreatic ducts, and show how the lobules have each a separate duct that opens into the main channel or duct of Wirsung, which itself opens into the ampulla of Vater, or directly into the duodenum, as described;

but it can also be noticed that a smaller channel, the duct of Santorini, usually discharges some of the secretion of the pancreas directly into the duodenum, and that in a certain proportion of cases the two ducts communicate.

The diagrams I have had made explain this. They show the result of observations by Opie on 100 cadavers, in which the ducts were injected and photographed, with the following results:—

In ninety-nine specimens the two ducts are united; in ten, two wholly independent ducts enter the intestine.

1. Of the ducts in anastomosis.
   - (1) Duct of Wirsung larger in eighty-four.
     - (*a*) Duct of Santorini patent in sixty-three.
     - (*b*) Duct of Santorini not patent in twenty-one.
   - (2) Duct of Santorini larger in six.
     - (*a*) Duct of Wirsung patent in six.
     - (*b*) Duct of Wirsung not patent in any.
2. Ducts not in anastomosis in ten.
   - (*a*) Duct of Wirsung larger in five.
   - (*b*) Duct of Santorini larger in five.

In 89 per cent. the duct of Wirsung was larger than the duct of Santorini, while in 21 per cent. the duct of Santorini was apparently obliterated near its termination. In six cases the duct of Santorini was larger than the duct of Wirsung. In all cases where the duct of Santorini is patent it diminishes in size towards the duodenum. Thus the duct of Santorini cannot be relied on in many cases to supplement the duct of Wirsung, if it be obstructed; moreover, the duct of Santorini, even if patent and communicating with the duodenum, may itself be compressed by a moderate-sized gall stone passing down the pancreatic portion of the common duct. It might be argued that if the two ducts communicate, why should not the duct of Santorini act as a safety valve to the duct of Wirsung when it is compressed, and thus free the pancreas from the retained secretion, which is in danger of becoming septic?

It will be seen that in only half or less than half of all cases will the duct of Santorini act as a safety valve if the duct of Wirsung is obstructed, for although in 63 per cent. of cases the duct opens at the same time into the main channel and into the intestines, yet in probably less than half of these is the anastomosis efficient as a through channel.

The reasons why gall stones in the common bile duct do not always produce pancreatic inflammation are—

(*a*) Some gall stones are so large that they never reach the pancreatic portion of the duct, but remain in the supraduodenal portions of the common duct, producing jaundice but no pancreatitis.

(*b*) In some cases the bile ducts and pancreatic ducts open by separate orifices, and any gall stone passing down the common

duct will not then necessarily compress or occlude the pancreatic duct.

(*c*) In exceptional cases the duct of Santorini is the principal outlet for the pancreatic fluid, it being of such a size as to afford a safe outlet to the secretion even when the duct of Wirsung is obstructed.

The third or pancreatic portion of the common duct is also of interest, for if it passes through the gland, any congestion or swelling of the head of the pancreas will, by the pressure it exerts on the common duct, tend to induce jaundice and its various sequelæ; whereas if it passes behind and not through the head of the gland, it will escape from pressure when the pancreas is inflamed.

The passage of the common duct through the substance of the pancreas in a certain proportion of individuals explains to my mind many of the cases of so-called catarrhal jaundice, which may come on as an extension from gastro-duodenal catarrh, or in the course of various ailments, and which I believe to be often dependent on catarrhal inflammation and swelling of the pancreas, leading to pressure on the bile ducts. In some cases I have proved this hypothesis to be correct at operations undertaken for chronic jaundice. I feel confidence, therefore, in stating my belief that many of the cases of acute jaundice, especially the form coming on in young subjects, and which usually clears up under medical treatment, are truly pancreatic and not biliary in origin, and I have seen some of these cases to pass on from the simple congestive or catarrhal form to true interstitial pancreatitis. I believe also that so-called chronic catarrh of the bile ducts leading to persistent jaundice is nearly always due to chronic pancreatitis, and that the obstruction to the flow of bile is outside and not inside the common duct.

As the duct is completely embraced by the pancreas in 62 per cent. of all cases, we may conclude that in about that proportion of cases a swelling of the head of the pancreas will produce jaundice, and, as supporting this view, this percentage corresponds with our clinical and pathological investigations of the urine of pancreatic cases.

A gall stone passing down a duct thus embraced by the pancreas is almost certain to exert pressure on the gland, and the resulting inflammatory changes may in their turn give rise to compression of the duct, which will result in jaundice that may persist long after the gall stone itself has passed.

Occasionally the ducts are obstructed by other causes than gall stones. A growth occurring in the ampulla of Vater or in the papilla will interfere with the free flow of the pancreatic secretion, and may give rise to catarrh of the ducts and chronic pancreatitis. An impacted pancreatic calculus or stenosis of the duodenal opening of the duct following ulceration will also

produce a similar result; and recently a case has been reported in which a portion of hydatid membrane was the obstructing agent.

How far the pancreatic lesion in these obstruction cases is to be attributed to the irritating action of the retained secretion, and how far to the associated bacterial infection, is difficult to say, but I believe that in all cases the latter plays an important part. Even when the blocking of the ducts is complete, and no direct communication between the micro-organisms in the duodenum and the stagnant secretion appears to be possible, the inflamed walls of the duct present a ready path for the passage of infection. This has been proved in the bile passages by aseptic ligature of the common duct. Absolutely complete blocking of the duct is, however, very uncommon, except in cancer cases, for Dr. Cammidge has recently shown, in a paper read before the British Medical Association at Leicester, that bile pigment can be found chemically in the fæces in nearly all other cases, even when the stools are free from colour to the naked eye.

Chronic pancreatitis may result from a direct extension of a duodenal catarrh to the pancreatic ducts, and this association of chronic pancreatitis with duodenal catarrh is, I believe, not at all uncommon. It has been shown experimentally that by injecting fæcal material or *B. coli* into the pancreatic ducts, or by providing a channel, such as an absorbent thread, by which organisms may enter from the bowel, pancreatitis is produced; and that after some time the gland, which is constantly being infected by a permanent channel, eventually becomes sclerosed.[1]

I have seen a considerable number of cases in which pancreatitis has followed chronic gastric or gastro-intestinal catarrh and duodenal ulcer, and in many of them I have been able to relieve the condition by operation.

The pancreatitis which is occasionally met with as a sequel of typhoid fever is probably due to a specific infection occurring in a similar way, though infection by way of the blood and changes due to toxæmia cannot be excluded. In support of this hypothesis is the fact that typhoid bacilli have been recovered from the bile in the common duct and gall bladder in some cases where operation has been undertaken.

Influenza and some other zymotic diseases are also occasionally followed by inflammation of the pancreas. In these cases infection may take place by way of the duodenum, or possibly through the blood. The chronic infections, tubercle and syphilis, may give rise to pancreatitis. In the former, chronic inflammatory changes may be found in the absence of definite tuberculous deposits, and the experiments of Carnot with tubercle bacilli and tuberculin in dogs, suggest that the changes are due to toxic substances circulating in the blood, rather than to the direct

[1] Opie, *op. cit.*, p. 192.

effects of the bacillus in the gland. Although there appears a probability that in the near future our knowledge of the bacteriology of syphilitic affections may be considerably increased, it is probable that syphilitic pancreatitis will prove to be a similar toxic manifestation. The influence of alcoholism in the production of cirrhosis of the liver is still a debatable point, and similarily its relation to chronic pancreatitis has not been settled. In some cases a history of alcoholic excess can be obtained, but in many this is not so. It is probable that alcohol is not of itself a direct determining cause, but that indirectly, by the influence it exerts on the circulation and by the production of a catarrh of the duodenum, it may give rise to pancreatitis.

Chronic pancreatitis and cirrhosis of the liver are not infrequently associated. According to the observations of Lefas and Opie, chronic pancreatitis may accompany either atrophic or hypertrophic cirrhosis, but while in the former the gland is enlarged and the newly formed fibrous tissue interacinar in distribution, in the latter no marked increase of size takes place, and it is the interlobular tissue that is increased in amount and density. I have operated on several cases of chronic pancreatitis in which cirrhosis of the liver was associated, and it is not uncommon to find both diseases present in long-continued obstruction of the common duct by gall stones.

In that peculiar condition hæmochromatosis, the pancreas is affected, and chronic interacinar pancreatitis follows the deposit of pigment and associated atrophy of the gland cells.

As in the kidney and other organs, an increase of fibrous tissue occurs in the pancreas in general arterio-sclerosis and endarteritis, and it is possible that the moderate increase found microscopically in a certain number (10 per cent. of Bosanquet's cases) of patients over 40 years of age may be attributed to this cause, but that it is not a common cause is shown by Opie's investigations (p. 199).

Occasionally one meets with chronic pancreatitis due to direct extension of the inflammatory process from a neighbouring organ, such as a chronic gastric ulcer eroding the gland. I have operated on several of these cases. I also operated on a case a short time ago in which a malignant growth of the pylorus had set up perigastritis and caused the stomach to become adherent to the pancreas, producing well-marked interstitial pancreatitis in the head of the gland, and I have seen the condition in other cases.

Acute or subacute inflammation of the pancreas, if not ending fatally, may resolve and be succeeded by chronic inflammatory changes that may ultimately lead to cirrhosis and to a fatal termination at a later date. In a case of this kind that came to autopsy a few months later, I was able to secure the pancreas and demonstrate these changes by means of the microscope.

In cystic disease of the pancreas, chronic pancreatitis is nearly

always present; in fact it is probably the compression of the smaller duct by the contracting newly formed fibrous tissue that in many cases gives rise to the cysts. Hence in doubtful cystic tumours in the abdomen, the discovery of the pancreatic reaction in the urine forms an important point in diagnosis. I have found it present in all the cases of pancreatic cysts that have come under my observation since I have been working at this subject.

All the causes of chronic pancreatitis that I have mentioned, except atrophic cirrhosis and hæmochromatosis, are associated with interlobular changes in the fibrous tissue, and from a surgical point of view this is the most important form of chronic inflammation to which the gland is liable, for it is capable of being distinctly benefited by operative interference if recognised at a sufficiently early stage.

The etiology of the interacinar variety is at present for the most part obscure, although, judging from the early stages at which the islands of Langerhans are affected and the centrifugal character of the new fibrous tissue formation, it is probable that the disease owes its origin to an abnormal state of the blood. It is therefore not likely to prove directly amenable to surgical treatment.

Symptomatology.—The onset of chronic pancreatitis varies with the cause. If it is due to obstruction of the common duct by a gall stone, there will be a history of painful attacks in the right hypochondrium, associated with jaundice and possibly accompanied by fever of an intermittent type. Tenderness at the epigastrium with some fulness above the umbilicus will usually be noticed; loss of flesh soon becomes marked, and if the pancreatic symptoms predominate, the pain will pass from the epigastrium round the left side even to the renal and scapular regions.

If, however, the condition arises by direct infection from a duodenal catarrh or from one of the other causes I have mentioned not connected with cholelithiasis, there may be merely an aching in the epigastrium or slight pain not at all pronounced, or the symptoms may come on painlessly, associated with dyspepsia and with slight jaundice, soon becoming more marked: in such cases the gall bladder may dilate and give rise to a suspicion of cancer of the pancreas which the rapid loss of flesh will tend to confirm. In either case a train of symptoms of a very definite character is set up, and I am quite at a loss to understand how the idea has gained currency that chronic pancreatitis is, as a rule, undiagnosable during life.

Physical examination of the patient will reveal in some few cases a swelling of the pancreas due to tumefaction of the head of the gland; but as the recti are often rigid from the pain and tenderness in the epigastrium, it may only be discoverable when the patient is anæsthetised.

Pain and tenderness, though usually present, may be little marked, but in some cases the pain is paroxysmal and severe, and

epigastric tenderness is well pronounced. By distending the stomach with gas, either by means of carbonate of soda and tartaric acid given in separate doses, or by pumping in air through the stomach tube, the relation of the stomach to the swelling can be readily made out. Resonance on percussion owing to the position of the stomach, unless the stomach is empty, communicated non-expansile pulsation and very slight movement on deep inspiration are characteristic of swellings of the pancreas.

In the more chronic cases, especially when the disease has reached the cirrhotic stage, if the cause be not gall stones, a tumour of the gall bladder is found similar to that met with in cancer of the pancreas. The distension is due to mucus, the bile which first filled it having been absorbed and the backward pressure having prevented fresh bile from entering the duct. The distension may occur so gradually as to be painless, and the gall bladder is then free from tenderness, which is less frequently the case in distension due to gall stones. In jaundice due to a stone in the common duct, the gall bladder is nearly always contracted and not capable of being felt.

Jaundice is not necessarily present at first, although it is usually met with at some stage of the disease, and is often well marked. It may vary from a slight icteric tinge, most marked in the sclerotics, to an intense mahogany hue. In chronic pancreatitis due to obstruction of the common bile duct by a gall stone, the jaundice is frequently very marked, as it is also in those cases where the duct passing through or grooving the head of the pancreas is compressed by the swollen gland; when, however, the common bile duct passes behind the gland, as it does in 38 per cent. of bodies, the patency of the passage may not be seriously interfered with and little or no jaundice be produced. An increase of temperature is, as a rule, associated with acute and subacute pancreatitis, but only rarely with any of the more chronic forms of inflammation, excepting in those cases where there is associated infective cholangitis, as in obstruction of the common duct by a biliary calculus and infection of the retained secretion, when there may be fever of an intermittent type and ague-like paroxysms.

Bearing in mind the important part the pancreatic secretion takes in the preparation of the food materials in the intestine for absorption, it might be expected that digestive disturbances would play a prominent part in the symptomatology of pancreatic disease, and this is in fact the case.

I have found dyspeptic disturbances to be constantly associated with affections of the pancreas; they take the form of anorexia with discomfort from flatulency, sometimes offensive eructations, heartburn, nausea, distaste for fats and for meat. Frequent, bulky motions, pale in colour, offensive, and obviously greasy, are usually present in advanced conditions, though in the earlier stages there may be constipation associated with flatulency.

These digestive symptoms are doubtless due, as a rule, to the absence of the bile and pancreatic fluids from the intestines; for instance, in the case of a woman, æt. 28 years, a biliary fistula was established in order to alleviate the jaundice and by drainage to relieve the pancreatitis that was causing pressure on the common bile duct. All the above-mentioned symptoms were well marked both before the operation and when the fistula was discharging, and the patient had such a loathing for food that she became extremely emaciated. A cholecystenterostomy was performed some time later to cure the fistula, and within twelve hours of the restoration of the bile and pancreatic fluid to the duodenum, she expressed herself as hungry, a sensation which she said she had not felt for many months. During the month after operation she put on flesh very rapidly, and three months later had gained 2 stones in weight.

Marked and often excessive wasting is a prominent symptom in many cases of pancreatic disease. This is no doubt in part due to defective digestion, but that this alone can account for the rapid loss of flesh often seen, I am not disposed to believe. I think that some disturbance of the internal metabolism of the body also plays a part, as shown by certain characters of the urine to be mentioned later.

An examination of the stools assists in arriving at a correct diagnosis in suspected chronic pancreatitis. The power of the organism to deal with proteids, fats, and starch are all interfered with, and although other organs and ferments may partly take on the work of the absent or altered pancreatic secretion, the results are imperfect, and some change in nutrition and in the characters of the fæces nearly always follows. Proteids may be partly dealt with by the gastric juice, and neutral fats may be decomposed to a certain extent by fat-splitting bacteria in the intestine; but where tryptic digestion is much interfered with, the ingestion of a normal amount of meat is followed by the appearance of undigested muscle fibre in the stools, and chemical examination of the fæces shows some excess in nearly all cases. Fermentative changes in the starchy foods due to the action of bacteria in the intestine may give rise to the formation of gases and irritating acids of the fatty series, and it is to this that the flatulence and offensive eructations to which I have referred are to be attributed.

The frequent, bulky, soft, white motions, out of all proportion to the amount of food taken, that are so typical of advanced pancreatic disease, owe their bulk partly to the abnormal quantity of undigested material passed through the bowel, and partly to the excessive fermentation. Their frequency is due to their bulk, and is no doubt contributed to by the excess of irritating bye-products they contain. Their white or slaty colour does not necessarily arise from the absence of bile pigment, although in

some cases this may contribute, but from the excess of undigested fat they contain. In an analysis of the fæces from fifty-three cases of pancreatic disease and biliary obstruction, nearly all of which were under my care, Dr. Cammidge found that stercobilin was present in forty-three, and that all those in which no trace could be found were suffering from malignant disease of the pancreas. Traces only were, however, discovered in six cases. In two of these there was a gall stone in the third and fourth part of the common duct, one was a case of advanced chronic pancreatitis, with very marked enlargement of the head of the gland, and two were malignant cases; so that in the majority of cases of chronic pancreatitis, even when there is a blocking of the duct by a calculus, a considerable quantity of bile pigment can be shown by chemical means to be present in the stools. In cancer of the pancreas, on the other hand, at least in the stages at which it usually comes under observation, more than a trace of stercobilin is exceptional.

Estimation of the percentage of neutral fat and fatty acids by a method Dr. Cammidge has described in his paper, shows that, as a rule, a difference in the relation between the two exists in pancreatic cases and in obstructive jaundice not associated with pancreatitis. In normal fæces the amount of neutral fat and fatty acids is about equal, but when the functions of the pancreas are interfered with, the neutral fat tends to be in excess; while in simple obstructive jaundice the fatty acids as a rule preponderate. In well-marked cases of pancreatitis the departure from the normal is very striking, as it is also in most cancer cases.

Although the percentage of total fat was found in most of these cases to be in excess of that usually met with in health, this was not by any means always the case even when the relation of the neutral fats to the fatty acids was markedly disturbed. An estimation of the total fat, therefore, although often useful, cannot be absolutely relied on as a sign of pancreatic disease, but I think it is probable that a knowledge of the relative amounts of neutral fats or fatty acids may often prove of distinct advantage in making a diagnosis. The diet of the patient will, of course, influence the character of the stools, and not only has the amount of fat ingested to be taken into account, but its nature must also be considered. The fat in milk is much more readily absorbed than mutton fat, so that even in health a meal containing a large proportion of the latter may raise the amount of undigested fat in the fæces. In most of the cases of pancreatic disease, the fæces were acid to litmus, whereas in simple jaundice they were usually alkaline. This is an additional sign of pancreatic disease, which can be readily applied clinically, and may often prove useful, should further experience substantiate its general truth.

Another test of the efficiency of pancreatic digestion is Sahli's symptom. If iodoform be enclosed in a gelatin capsule, hardened

in formalin, and given by the mouth, it is almost unaffected by gastric digestion, but is readily dissolved by the pancreatic secretion. If pancreatic digestion is normal, iodine should appear in the urine in from four to eight hours. The absence of the reaction or its delayed appearance, if the motor functions of the stomach be normal, indicates, according to Sahli, an impairment of pancreatic digestion.

The pancreas not only takes an important share in the preparation of the food for absorption into the body, but modern views assign to it an important part in the maintenance of the normal equilibrium of metabolism. I have already referred to the marked wasting seen in many cases of chronic pancreatitis, and mentioned that I do not think it can be altogether explained by disorders of digestion. As yet this is merely a pious opinion based on clinical experience, but of the influence of the pancreas on the carbohydrate exchange within the body there can be no doubt. Not only is this proved by experiments on animals, but observation on the human subject has shown that disease of the pancreas is present in considerably over half of all fatal cases of diabetes. It might be expected, therefore, that glycosuria would be a prominent symptom of disease of the pancreas, but in my experience this is not the case. Excepting in acute destructive lesions and advanced cases of chronic pancreatitis, glucose is not found in the urine. Its absence in the face of other symptoms of disease of the pancreas only shows that the case is still at a stage in which it may be benefited by treatment.

A more useful diagnostic point is the presence of alimentary glycosuria. Minkowski has shown that if only a part of the pancreas be removed, diabetes does not result, but the ability of the organ to perform its normal function on carbohydrate metabolism is impaired; for if to animals in which the pancreas has been partially removed, sugar be given in large quantities, temporary glycosuria results. Wille has observed the symptom in man in association with disease of the pancreas. He adopted the test of giving from 2 to 3 oz. of sugar before breakfast to 800 patients, the urine being tested before the sugar was taken, and later at intervals of two hours. When the test was positive, glycosuria usually occurred at the end of two hours. Of fifteen patients exhibiting alimentary glycosuria who subsequently came to necropsy, ten presented grave pancreatic disease, chronic interstitial pancreatitis, or cancer. Although this symptom may occur under other conditions, as exophthalmic goitre or chronic alcoholism, its presence has considerable value as an aid to diagnosis.

In addition to glucose, other sugars have been described as occurring in the urine in pancreatic disease. Le Nobel and von Ackeren, Rosenheim, and others (Blumenthal, p. 163) have found maltose in cases examined by them, and so far as is known at

present maltosuria is confined to pancreatic disease. Unfortunately it is by no means a common symptom, and cannot be relied upon for diagnostic purposes. Out of 245 specimens of urine from cases of pancreatic disease, Cammidge[1] only met with two in which maltose was proved to be present, and five in which traces of a phenylhydrazin compound having the characters of maltosazine were obtained.

Hammarsten has found pentose among the cleavage products of a nucleo-proteid obtained from the pancreas, and in dogs extirpation of the gland is said to be followed by an excretion of pentose in the urine. It is not surprising, therefore, than pentosuria has occasionally been met with in disease of the pancreas. Although it has been claimed by Salkowski that pentosuria is of greater diagnostic importance than maltosuria, it is of such infrequent occurrence that it is practically valueless. It was not met with by Cammidge in a single one of the 245 specimens examined by him, and in none of the more recently reported cases of simple pentosuria has there been any indication of disease of the pancreas.

Gerhardi from observations on man, and Piscini from experiments on dogs, thought that changes in the amount of indican in the urine afforded diagnostic evidence of pancreatic disease, but Katz and de Renzi's experiments disproved this. An excess of indican occurs in the urine in any condition which favours putrefactive changes in the intestine, and although there is no doubt that in many cases where the pancreas is diseased an abnormal amount of indican is present in the urine, it is probably only indirect evidence of the fermentative changes in the intestinal contents to which I have referred, and which we have more accurate methods of estimating.

Of all the cases of pancreatic disease that I have seen, I have only once found lipuria as a symptom, and that was in a case of chronic pancreatitis in a lady, æt. 44, the cause being apparently an extension from duodenal catarrh. The abdomen was opened, and a swelling of the pancreas was discovered with a number of adhesions surrounding it, but no gall stones were found. Drainage of the bile ducts by a cholecystenterostomy completely cured the pancreatic condition. Lipuria is difficult to explain. It may appear in apparently healthy persons in pregnancy, diabetes, phosphorus poisoning, and fatty degeneration of the kidneys. It has also been described in a case of cancer of the pancreas. In the case I have mentioned it was not associated with any signs of diseased kidney or diabetes, and the patient was not pregnant. As it occurs so seldom, it cannot be relied on as an important point in affections of the pancreas.

In my Hunterian Lectures I referred to the help in diagnosis afforded by the so-called "pancreatic" reaction in the urine which was described in detail by Cammidge in his Arris and Gale Lecture

[1] *Lancet*, July 1, 1905.

the same year. I can add little to what was said then concerning it, save that subsequent experience in a considerable number of cases has served to strengthen my convictions that when skilfully carried out by a competent and experienced observer, it is of great assistance in arriving at a correct opinion in suspected cases of disease of the pancreas. It is perhaps unfortunate that for want of a better term the name "pancreatic" was applied to the test, as it may have tended to suggest to those who failed to make themselves thoroughly acquainted with my own and Dr. Cammidge's remarks on the subject, that it was a specific test pathognomonic of pancreatic disease. The results of the test need to be interpreted in conjunction with the other available evidence both clinical and chemical; but when it is considered, as it was intended that it should be, as an additional sign, it has in my experience been of the greatest use. In a recently published paper dealing with his results in nearly 300 examinations, Cammidge has shown that although occasionally his interpretation of the results needed modification in the large majority, the opinion formed from an examination of the urine or of the urine and fæces together was confirmed at operation or by the subsequent course of the case. Work in connection with this subject is still being carried on, and there is reason to hope that some of the causes of difficulty, especially in the less marked cases, have been overcome.

There is in many pancreatic affections a tendency to general hæmorrhage from wounds or from mucous surfaces, nose, uterus, and intestine, and to petechial hæmorrhage in the skin, or to more extensive bleeding in the subcutaneous tissues. Some years ago I thought this to be altogether dependent on the cholæmia, until increased experience in operating on deeply jaundiced patients had taught me that there is much less danger of serious hæmorrhage in patients jaundiced from gall stones than in those where the jaundice depends on or is associated with pancreatic disease. This tendency may be due to an altered condition of the blood, both in its tissue elements and chemically. In the cases where the blood has been examined for me, a very marked diminution in the number of blood plates has been found, and the coagulation period has always been seriously delayed. It is well known that a diminution in the lime salts leads to a tendency to hæmorrhage, and as we have found that there is in nearly every case of pancreatitis a profuse excretion of lime in the shape of oxalates, this gives another explanation, and also explains the beneficial effects resulting from the administration of calcium lactate or chloride. In urine containing bile, calcium oxalate crystals are not generally found microscopically, because the bile takes up the lime salts; but after the jaundice has been relieved by operation, an examination of the urine will, as a rule, show oxalate crystals so long as any pancreatic trouble continues. The composition of pancreatic calculi is of interest as bearing on the relation of the pancreas to

calcium salts. Pancreatic calculi always contain a large percentage of lime, 50 per cent. or more, and in some instances appear to be formed of calcium oxalate. As pancreatic lithiasis apparently results from an inflammation extending from the duodenum up the ducts, it would suggest that inflammation of the pancreas in some way causes a removal of the lime salts from the blood.

Seeing that the formation of pancreatic calculi and the deposit of calcium salts on the wall of the ducts is always associated with catarrh of the ducts and with a chronic inflammation of the pancreas, I ventured to describe the condition in my Hunterian Lectures as pancreo-lithic catarrh, and I showed several specimens in which the pancreatic ducts were lined with a calcareous deposit.

Chronic pancreatitis is in many cases accompanied by a considerable degree of anæmia, which may occasionally progress and assume a pernicious type. In the cases we have examined, the red cells have averaged three to three and a half millions per c.mm., and the hæmoglobin 50 to 70 per cent. There has not, as a rule, been any marked leucocytosis, although occasionally fifteen thousand or sixteen thousand white cells per c.mm. have been found.

Although in any single case we may not have all the symptoms and signs that I have mentioned, yet in no case ought we to fail to find evidence of digestive, metabolic, or physical signs if chronic inflammation of the pancreas be present.

No single symptom can alone be relied upon as diagnostic of chronic pancreatitis, but on considering all the available evidence there is not usually much difficulty in forming an opinion. I think that special stress can be laid upon the progressive wasting, the usual presence of jaundice, the dyspeptic disturbances, the pancreatic reaction in the urine, and the results of the chemical examination of the fæces. Each case, however, has to be considered on its merits, and in making the diagnosis one has to bear in mind the difference in the symptoms produced by the various causes as well as by the variations in the anatomy of the ducts.

In the differential diagnosis of chronic pancreatitis, the most important conditions to consider are cancer of the head of the pancreas, cancer of the common bile duct, cancer of the liver, gall stones in the common duct, and chronic catarrh of the bile ducts.

In cancer of the head of the pancreas the onset is usually gradual and painless, and the disease usually occurs later in life, generally after 40 years of age. It is preceded by general failure of health, and when jaundice supervenes it becomes absolute and unvarying. The gall bladder is nearly always distended, and may attain a large size. It is not tender on manipulation. The liver enlarges from biliary stasis, but there are no nodules to be felt. In some rare cases a hard nodular tumour may be felt on the inner side of the distended gall bladder. The fæces are usually acid in reaction, and contain a large amount of undigested fat,

only a small proportion of which consists of fatty acids. The pancreatic reaction in the urine shows a few large crystals which are only very slowly soluble in dilute sulphuric acid in typical cases, but unless the reaction is very carefully performed they may easily be missed. In some cases, too, where there is much attendant inflammation of the pancreas, their presence may be obscured by the changes in the urine resulting from the inflammation, so that in suspected cancer cases considerable skill and experience are required in carrying out the urinary examination if the results are to be relied on. The extremely rapid loss of weight and strength with increasing anæmia, but without ague-like seizures, is very characteristic, and it is common for there to be an absence of fever, or indeed a subnormal temperature, with a slow feeble pulse, and later ascites with œdema of the lower limbs. The great importance of an accurate diagnosis between cancer of the head of the pancreas and chronic pancreatitis, lies in the fact that while the latter is eminently a curable disease when submitted to early operation, the former is not benefited by surgical treatment, which moreover is attended by no little danger from various complications.

Cancer of the common duct is rare, and is usually associated with gall stones. If the disease involves the papilla, the symptoms are indistinguishable from those of cancer of the head of the pancreas, excepting that the urinary pancreatic reaction is more likely to be of the inflammatory type from the associated changes in the gland due to the damming back of its secretion. If the growth is situated above the opening of the pancreatic duct, it will not interfere with the functions of the pancreas: the loss of flesh will not be so rapid, the typical pancreatic reaction in the urine will be absent, and although there may be an excess of fat in the fæces, this will chiefly consist of fatty acids.

Cancer of the liver is distinguished by the irregular enlargement and nodular feel of the organ, the rapid deterioration of health, the less intense jaundice, and the absence of fever and paroxysmal pain: the pancreatic reaction is negative, or the "A" and "B" reactions give parallel results.

A diagnosis of gall stones may be made by the sequence of a long antecedent history of spasms without jaundice, then a severe attack of pain followed by jaundice, and after a time recurrent pains with increase of icterus associated with ague-like seizures. The absence of tumour is more common in gall stones than in chronic pancreatitis, though in the latter the gall bladder may be found contracted at times.

The paroxysmal attacks in chronic pancreatitis may be equally as severe as in gall stone seizures, but there is usually less pain. The tenderness, however, with gall stones will be over the gall bladder, and in pancreatitis at the middle line where the swollen gland can sometimes be felt, especially if the patient is thin or

under the effect of an anæsthetic; moreover, the radiating pain in gall stones is towards the right infra-scapular region, and in pancreatitis towards the left or to the mid-scapular region. When the gall stones are situated in the first or second part of the common duct, the pancreatic reaction is negative and the fæces alkaline in reaction. The motions, although often containing a considerable excess of fat, do not show the high proportion of neutral fat usually found in pancreatic cases, but are as a rule rich in fatty acids. When, however, a stone is impacted in the third part of the duct, there is, as I have shown, a probability that in the majority of cases the pancreas will be inflamed; and when the calculus lies in the fourth part, the pancreas is almost certain to be affected. The diagnosis of chronic pancreatitis from gall stones is, however, not one of any great practical importance, since the two conditions are often associated and the treatment is, at least up to a certain point, the same.

Chronic catarrh of the bile ducts is characterised by jaundice and loss of flesh coming on for the most part painlessly, but since I believe it is usually of pancreatic origin, as I explained earlier in my address, it is not necessary to spend much time in discussing it further.

Although the diseases I have mentioned are the most likely to cause confusion in diagnosis, they are not by any means the only ones for which I have seen chronic pancreatitis mistaken. More than one patient has been sent to me, who, from his colour and recurrent rigors, has been believed to be suffering from ague. The absence of malaria organisms in the blood, the presence of the pancreatic reaction in the urine, a chemical examination of the fæces, and a careful consideration of all the physical signs and symptoms, has quickly revealed the true condition of things, which has been confirmed by operation and the subsequent course of the case.

The blood changes met with in chronic pancreatitis suggesting pernicious anæmia have in some instances led to an incorrect view of the case being taken, until the possibility of their being of pancreatic origin was pointed out.

The prognosis of chronic interstitial pancreatitis surgically treated is very favourable, but the longer the disease is left untreated the more serious the outlook becomes. In some cases it may slowly progress for months or even years, but ultimately I believe the well-marked cases die either from asthenia or more rarely from hæmorrhage or diabetes. A marked hæmorrhagic tendency usually shows the near approach of a fatal termination, and when diabetes has supervened, the disease is, as a rule, so far advanced that surgical interference is not likely to do more than possibly delay its progress, though I do not think that a moderate degree of glycosuria need be a bar to operation, as this may arrest the progress of the disease.

Treatment.—Before considering either medical or surgical treatment of pancreatic catarrh or of interstitial pancreatitis, I should like to urge the importance of preventive treatment by attention to the causes, some of which, such as gall stones, are removable by operation in the early stages with a very small risk, not more than from 1 to 2 per cent. in skilled hands. Again, duodenal catarrh as a cause of pancreatic catarrh and of interstitial pancreatitis is remediable by medical treatment; and duodenal ulcer, another cause, if not remedied by careful and thorough general treatment, can be cured by gasto-enterostomy with a very small risk, as shown by the results in my last series of 100 cases of gastro-enterostomy for gastric and duodenal ulcer, with a mortality of 1 per cent.

If, after a fair trial of general treatment not too long continued, the symptoms persist, and the signs of failure in pancreatic digestion and metabolism are manifesting themselves, the question of surgical treatment should be seriously considered, especially when the disease is associated with jaundice, for the condition is one that, if not relieved early, will certainly lead to serious degeneration both of the liver and pancreas, and become dangerous to life in several ways.

Rational treatment should aim at the cause, whether that be gall stones, pancreatic calculi, duodenal catarrh, duodenal or gastric ulcer, alcoholism or syphilis.

In operating for chronic pancreatitis when medical treatment has failed to relieve, the surgeon must be prepared to do a thorough operation, so as to expose the whole length of the common bile duct as well as the head of the pancreas. He will then be able to remove the cause should it prove to be a gall stone or a pancreatic calculus, or any other removable condition. In the absence of some obvious removable cause, it is advisable to secure efficient drainage of the infected bile and pancreatic ducts, either by cholecystotomy or cholecystenterostomy, preferably the latter. Where the pancreatic disease is dependent on duodenal catarrh associated with ulcer of the duodenum, it may be advisable, at the same time that the bile passages are drained, to perform also a gastro-enterostomy in order to cure the original cause of the disease. Experience has taught that if the cause can be removed at an early stage, an absolute cure is possible; and though complete restoration of the damaged gland in more advanced cases cannot always be promised, yet an arrest of the morbid process may be looked for, and the remaining portion of the pancreas will be able to carry on the metabolic, even if incompletely the digestive, functions of the gland.

Results.—In considering the after-results of the surgical treatment of the class of cases under consideration, it is necessary to give both the immediate risks of operation and the ultimate issue of those cases that recovered. To this end letters were

addressed to the friends or medical attendants of all my patients who had not recently been heard of.

Of 102 operations undertaken in patients where chronic pancreatic trouble constituted the chief disease, or where it formed a serious complication of other diseases, 96·1 per cent. of cases were followed by recovery, giving a mortality of 3·9 per cent.

Of the four cases that died, one was a cholecystotomy undertaken in a patient very deeply jaundiced and reduced to the last stage of exhaustion before a surgical opinion was sought, and where at autopsy a cirrhotic condition of the head of the pancreas was found. The second was a cholecystenterostomy undertaken in a deeply jaundiced patient in the presence of extensive adhesions, which, on account of the feeble condition of the subject, seemed too formidable to deal with. In this case a necropsy revealed a calculus in the pancreatic portion of the common bile duct, occluding the opening of the pancreatic duct, which would have been discovered had the patient's condition permitted a thorough exploration. A third in a very feeble patient operated on away from home, extremely jaundiced, and suffering from repeated rigors. Drainage was imperfectly carried out, and she died of cholæmia two weeks later. And a fourth was a choledochotomy in an aged feeble man, who died of heart failure accelerated by intestinal hæmorrhage in the third week after operation, when the wound had healed.

In the fifty-five cases of catarrhal interstitial pancreatitis where gall stones were found obstructing the pancreatic portion of the common duct, choledochotomy was performed in forty-two, cholecystotomy in nine, and cholecystenterostomy in four.

Of the fifty-two patients that recovered, forty-eight were living and well when last heard of; one is apparently well nine and a half years subsequent to operation, though sugar has recently been found in his urine; one died from cirrhosis of liver and ascites a year after, it being present and far advanced at the time of operation. Another has since died of acute bronchitis, and another from some other non-specified ailment.

In one case where the cause was pancreatic lithiasis, where calculi were removed both from Wirsung's and Santorini's ducts, the patient is now in very good health.

In forty-six cases of interstitial pancreatitis without gall stones or other removable cause, the bile ducts, and thus indirectly the pancreatic ducts, were drained in nineteen cases by simple cholecystotomy, in seventeen by cholecystenterostomy, and in five by separation of adhesions and thoroughly freeing the ducts. Of the forty-five patients that recovered, no reply to letters was received from six, who were well some time after operation. The rest were in good health when last heard of, with the exception of one (not drained) who has developed

glycosuria some years after operation, but is otherwise well: one who shows signs of permanent damage to the pancreas by the urinary test: and one who has anæmia suggestive of the pernicious type.

Besides the nineteen cholecystotomies were five where the pancreatitis was associated with duodenal ulcer, and in these cases a posterior gastro-enterostomy was performed at the same time, with good results in every case.

It will thus be seen that in a very large percentage of cases the removal of the cause, together with drainage of the bile ducts, or, in the absence of a removable cause, the simple drainage of the bile ducts alone, is an operation that may be safely recommended in suitable cases that have failed to yield to general treatment.

Did time permit, I could give cases to illustrate the various points I have dwelt on in diagnosis and treatment, but I trust that the description I have given, and the results I have related, will induce others to take up the subject, for it is one that will well repay further patient investigation.

HEREDITY.[1]

By J. Arthur Thomson, *Professor of Natural History in the University of Aberdeen.*

The study of heredity is imperative on all who would look upon the world of life with clear eyes, who would swim, not merely drift, in the complex system of currents we call human evolution. To the medical man, in particular, as the chief experimenter on life in its highest forms, as the supreme "practical biologist," the study of heredity is obligatory. As adviser, as healer, as hygienist, he is inhibiting his own powers and missing some of his opportunities if he holds aloof from the precise study of the fundamental problems of inheritance. Yet the subject finds little place in the crowded medical curriculum, it finds no more than scanty treatment in any text-book, and many of the most important books and papers dealing with it may be looked for in vain even in well-stocked medical libraries. A practical answer to this reproach has been that there is no comprehensive treatise on the subject, that the biological discussion is often too specialised and often too controversial, and that, apart from brief articles in encyclopædias, there is no very convenient way of tackling the question as a whole,—no way, at any rate, that is feasible for busy men with a large practice. Now, however, this answer is impossible, for Dr. Archdall Reid has supplied us with a comprehensive

[1] "The Principles of Heredity, with some Applications." By G. Archdall Reid, M.B., F.R.S.E., pp. xiii. and 359. London: Chapman & Hall Ltd. 1905.

work, directly addressed to medical men, replete with evidence drawn from the study of disease—on which, therefore, the physician can form his own judgment as to the author's conclusions. Whether we agree with all that Dr. Archdall Reid says or not, is a minor matter; it cannot be denied that he has afforded us a convenient way of getting into close grips with the whole subject of heredity.

But the medical reluctance to take the study of heredity seriously is due to something behind the absence (hitherto) of any convenient treatise. It is partly based on an awareness that the biological investigation of the relation between successive generations is still—what one may call young. It seems to the outsider that biologists are all at sixes and sevens on the subject, and that there are few certainties. For instance, the dispute between those who believe in the transmission of acquired characters and those who do not,—between Lamarckians and Weismannists, for short,—has drawn its weary length along, till the busy practical man exclaims, "A plague on both your houses." But even in this instance, a week or two of such serious study as the medical man is willing to give to, say, the theory of immunity or the latest interpretation of carcinoma, would enable him at least to avoid persistently misunderstanding the precise point at issue, and to take up a less mugwumpish attitude to a very vital question. Moreover, within the last few years the biological study of heredity has made great strides; there are many areas of clearness amid the mist, there are many certainties amid much that remains uncertain. Dr. Archdall Reid's book makes this very clear.

Perhaps we are exaggerating the reluctance—which we hope Dr. Archdall Reid's book will go far to remove—but we confess to having been rather startled by coming across the following utterance of an expert worker: "For the practical physician the conception of heredity is absolutely useless. He should not reckon with it at all. What is developed in man in the course of life, that can be treated. What comes from his forbears, that is unalterable." This seems to imply that hereditary predispositions *must* run their course, *must* find expression, which is manifestly untrue; it seems to imply that we can at once discriminate between what is acquired and what is inherited, which is also untrue; and it seems to imply that a practical medical interest is or should be confined to the individual, without thought of posterity, which, if true, would be very lamentable. We do not think, however, that the author whom we have quoted could have spoken as he did, if he had read Dr. Archdall Reid's book. Thus, for three reasons indicated, we would seriously commend the volume before us to the careful consideration of medical men. It is full of facts, it is carefully and clearly written, it is always interesting, and it has an outlook of its own.

The author defines the science of heredity as that science which deals with the organic relationships of progenitors with descendants, and with his introductory discussion of the problems the majority of biologists will agree. He accepts the concept of the "germ-plasm"—the material vehicle of inheritance within the nucleus of the germ-cell; all evolution depends essentially on gradual changes in the character of the germ-plasm; the raw materials on which selection operates are inborn variations of the germ-plasm; acquired characters or somatic modifications are not proved to be transmissible, and have no direct evolutionary importance. The Lamarckian theory of evolution is fairly stated, and gently but firmly rejected; the Darwinian or selectionist theory is alone in the field, for the "Bathmist" theory is not regarded by Dr. Archdall Reid as worthy of serious consideration. We think it has much more to say for itself than the author imagines, and the curious thing is that he is a bit of a Bathmist himself.

While the early chapters in the book will command general assent, we soon come upon more doubtful doctrine. Dr. Archdall Reid is a keen upholder of the idea that "the development of every individual is a recapitulation (with inaccuracies, with omissions and additions) of the life-history of his race"; it is a "dim, blurred, and inaccurate recapitulation, because many characters have disappeared or are disappearing through reversion, because many characters have been rendered latent, and because many characters which were originally absent have been interpolated in the course of the life-history." But so many saving clauses are necessary, that we cannot help doubting if the theory of recapitulation is such a luminous formula as the author makes it out to be.

Another of the author's favourite concepts is regression. "A regressive variation constitutes a deviation from the parental towards the ancestral type." "Regressive variations tend to be of greater magnitude and prepotency than progressive variations; the tendency to regression is always greater than the tendency to progression." "Regressive variations are absolutely necessary to the existence of complex and variable types." "But obviously indiscriminate regression would act as an obstacle to adaptation. Natural selection, therefore, has evolved biparental reproduction, which regulates the tendency to reversion in a very beautiful, effective, and discriminating manner. It aids natural selection to preserve structures and variations when they are useful, and assists regression to eliminate them when they are useless. It is a selective source of regressive variations in offspring; never a cause of any sort of progressive variations." "Natural selection seizing on progressive variations causes progressive evolution. Biparental reproduction seizing on regressive variations causes regressive evolution." "Natural selection may be compared to a sculptor who designs and roughly prepares a statue; reversion,

to a colleague, more skilful mechanically, who chisels out its finer lines."

We have stated in outline the view which Dr. Archdall Reid holds in regard to regression or reversion (for he says they are the same), but we cannot profess to understand it. We understand what is meant by variations towards a distant ancestral type, and variations towards the mean of the general population,—Galton's filial regression, but we do not understand the author's reversion. It is "the unknown factor in evolution," "a force continually at work in nature," something opposed to natural selection and yet improving its effects, something which eliminates variations, something regulated by biparental reproduction, something which affects a race or character only when the environment is beneficial, something which is the necessary result of development by recapitulation, something without which the recapitulation of the life-history would be impossible in the development,—and many other wonderful things are said about it. It seems to us a will-o'-the-wisp or "bogey."

To one point only we would refer. Regression has come to be a technical term, indicating the tendency that variations have to approximate to the mean of the population in question. Galton and Pearson make it quite clear that the technical term includes progression, as when the children of abnormally short parents approximate towards the average by being taller than their parents. Fathers with a mean height of 66 in. give a group of sons of mean height 68·3 in., that is progressing towards the mean of the general population of sons. Thus we are unable to follow Dr. Archdall Reid in his identification of regression and reversion. It must also be noted that the offspring of *asexually* reproducing parents also exhibit regression.

One of the most admirable parts of the book is the careful discussion of use-inheritance. The precise point at issue in the controversy as to the transmissibility of acquired characters is this: Does a change in the body, induced by use or disuse, or by a change in surroundings, influence the germ-plasm in such a specific or representative way that the offspring will exhibit the same bodily modification which the parent acquired or even a tendency towards it? Dr. Archdall Reid answers with an emphatic negative. But he goes further. He will not admit that environmental influences are capable of initiating any real variations in the germ-plasm. Many have supposed that nutrition, or toxins, or similar powerful influences, may induce germinal variations, but the author will have almost none of this, and his chapter on "The Argument from Disease" is very interesting in this connection. He comes to the conclusion that "the survival of the fittest must have rendered the germ-plasm nearly, if not quite, insusceptible to external influences, so far at least as its hereditary tendencies are concerned." Lack of health in the germ-cells of one parent may

cause the characters of the other parent to preponderate in the offspring, yet "no traits new to both parents" appear. The most that disease can do in this direction is to bring about "a mere temporary alteration of the germ-cell, which affects the individual which arises from it, but not his descendants." "The germ-plasm is stable, and its stability has been evolved and is still being maintained by natural selection." "Of this at least we may be sure, that, if external influences acting on the germ-plasm do alter offspring, then in the immense majority of instances, the change is not a true variation, a true alteration of hereditary tendencies, but merely an acquirement which affects the individual, but not his offspring and descendants."

It is difficult, however, to see why a change in the germ-plasm followed by a change in the offspring, is not worthy of being called a "true variation," because it is not repeated in the third generation. Many variations are transient fluctuations. It is difficult to understand what warrant there is for suggesting that a variation must include a trait, "new to both parents." In thousands of cases a variation is merely a little less or more of a particular character. It is difficult to understand the argument that, if variations are caused by the direct action of the environment on the germ-plasm, then the doctrine of natural selection is not true. "If influences from the environment are causes of variation, then every influence produces a definite type of variation, or it does not. If it produces a definite type of variation, then natural selection is rendered nugatory": as if all the environmentally induced definite variations must needs be equal in amount. "On the other hand, if we suppose that given influences cause variations, but not variations of a definite type, then we must admit that the germ-cells must differ among themselves, apart from any changes caused by the action of the environment: and if we admit this, we admit the existence of a sufficient cause for variations. If we seek a further cause, we violate the scientific principle of parsimony." But it may quite well be that the deeply saturating environmental influences, which we know to be real, serve as liberating stimuli to the heterogeneous germ-cells, or make them more heterogeneous still.

From the author's reference to the law of parsimony, one would think that he had himself a clear-cut and satisfactory theory of the origin of variations. We do not think that this is the case. He is vigorous in destructive criticism, but there is little positive contribution to this difficult problem. He makes it clear that bodily modifications must not be confused with heritable variations, and he rejects, as we have seen, the theory that the environment induces germinal variations. The theory that variations may be due to amphimixis or "the intermixture of somewhat dissimilar germ-plasms in biparental reproduction," is admitted to be applicable in some cases, but not as a cause of "spontaneous"

variations. He allows that it causes definite variations (p. 51), or regressive variations (p. 69). Therefore the latter are not "spontaneous"; but how the author knows all this we cannot understand. In passing we may note that paragraph 142, to which we are referred for further light on the origin of variations, appears to be absent from the book.

There are other paragraphs which disclose the author's theory of variation. "If spontaneous variations are not due to the transmission of acquirements, nor to the direct action of the environment on the germ-plasm, nor to biparental reproduction, to what then are they due? Undoubtedly to an inborn tendency to vary, a tendency that is inherent in the germ-plasm of every species of plant and animal. But whence this tendency?" In the distant past, he suggests, "there arose beings that had a tendency to be heterogeneous in structure, and the fragmentation of which therefore produced offspring that varied among themselves. The question as to the steps by which this departure from homogeneity was achieved is interesting, but it is not material to the matter in hand. Very plainly it did occur somehow. By some means or other it came about that organisms produced offspring that varied spontaneously amongst themselves. Possibly or probably the result was brought about by the environment acting directly on the individual, but affecting his different parts (*e.g.*, outer and inner parts) differently." Natural selection did the rest; it evolved the spontaneously varying organisms; it still has the power of automatically increasing or diminishing the crop of variations.

Variations then are due to variability; and variability was possibly or probably due to the diverse influence of the environment. Why the environment which worked at the beginning should cease to work, we do not understand, but we are told that natural selection has weeded out organisms whose germ-plasm was susceptible to environmental influence. What a charmed life the germ-plasm has, according to our author! We wish to make two other remarks in this connection.

In one of his references to Weismann, the author says: "Weismann's theory of regression is founded on his theory of heredity, which, in turn, is founded on the supposition that the progressive variations are due to biparental reproduction. Since it is evident that they are not, his whole hypothesis collapses." An author so emphatic as Dr. Archdall Reid should be at pains to be accurate. We find that Weismann says, in a work published before Dr. Archdall Reid's, "I do not regard this amphimixis as the real root of variation" . . . or again, "amphimixis, that is, the union of two germ-plasms, does not of itself cause variations of the determinants, it only arranges the ids (the ancestral plasms) in ever-new combinations." It is well known that Weismann finds the root of all heritable variations in the germ-plasm, whose components oscillate

in response to minute nutritive changes, and work out a resultant by a process of intra-germinal struggle. Later on, Dr. Archdall Reid says that Weismann "believes that variations are caused in the first instance by influences from the environment, but that they are subsequently shuffled and re-shuffled during the repeated acts of sexual reproduction." But even this does not bring out fairly the two characteristic features in Weismann's theory of variation, namely—(1) that continual slight fluctuations in the determinants occur in consequence of the fluctuations in the nutritive stream, and (2) the concept of germinal selection.

Our second point is this. Dr. Archdall Reid believes that the variability of the germ plasm is a primal and inherent quality. It is of the very nature of the physical basis of inheritance to be a fountain of spontaneous variations. But this is the kernel idea of the so-called "Bathmism," which the author treats so cavalierly.

It has been difficult to deal with this important work in a satisfactory manner, for our dissent from many of the author's conclusions ought to have been backed up by detailed arguments which could not be included here. It seems to us a pity that he should have given so much prominence to such debatable questions as his theory of regression, and weighted the book with much that cannot be fairly included under the title "Principles of Heredity," *e.g.*, the chapters on religious teaching, scholastic teaching, reflex action, the origins of zymotic diseases, bacteria as empire-builders, narcotics. But these will be full of interest to many. We regret that we have not been able to allude to the chapters on natural selection among civilised men, acquired immunity, evolution against disease, or those on mental evolution.

The concluding chapter on practical problems touches the high water-mark of faith in selection. Thus, "slum life strengthens the race, owing to the increased elimination of the unfit, but it strengthens it only against the conditions which surround slum life." "Conditions adverse to the individual do not tend to cause racial deterioration, but beneficial conditions do," for many survive who would otherwise have perished. Nature's "great and successful scheme of temperance reform"—by eliminating drunkards, is safer than repressive legislation, and surer than futile attempts to eliminate drink. "The evidence of all history indicates that the real solution of the problem must come from elimination, not of drink, but of the drunkard." Dr. Archdall Reid does not discuss the fact that many of the finest psychical types are eliminated by alcoholism, as also by phthisis, and that for this reason among others we are forced to try to aid natural selection by modes of rational selection. The author admits this, indeed, when he says, "Selective human breeding, in so far as certain types must be forbidden to reproduce themselves, is a dire necessity and therefore a certainty in the future."

Everyone will agree with his conclusion, which also indicates

the spirit that animates the whole book: "The time has arrived when the subject of heredity must engage the attention of thinking people, especially medical men. A knowledge of it should be a part of the ordinary professional equipment of the physician. . . . A great field of knowledge, in which biology and political history meet, remains untilled. It is the task and the duty of medical men to gather its harvests and apply them to the future betterment of mankind. . . . Owing to improvements in medical science and the consequent survival of the hitherto unfit, tremendous problems have arisen, the solution of which cannot long be delayed without disaster to the species."

THE TUBERCULOSIS PROBLEM AS AFFECTED BY THE INTERNATIONAL CONGRESS ON TUBERCULOSIS, HELD AT PARIS, OCTOBER 1905.

By R. W. Philip, M.D., F.R.S.E., *Senior Physician to the Royal Victoria Hospital for Consumption, and Assistant Physician to the Royal Infirmary, Edinburgh.*

In September 1901, shortly after the sitting of the British Congress on Tuberculosis, the *Edinburgh Medical Journal* published a review of the Congress under the title, "The Tuberculosis Problem as affected by the British Congress on Tuberculosis." The paper sought to answer the questions—What had been the net result of the meeting? Had any definite advance been made in our knowledge of tuberculosis? Had any new ground been broken? For what practical outcome might we look?

The purpose of the present paper is to review similarly the International Congress on Tuberculosis which has just held its session at Paris. The Congress may fairly be described as international, judged by the fact that thirty-four different nationalities were represented at the meeting. Of four thousand persons who composed the Congress, the overwhelming majority was naturally French. Still, representative men from the leading countries of the world took part in the proceedings.

When it is recalled that no less than forty carefully prepared and lengthy reports on specific topics were presented to the Congress by selected representatives from different countries, and that eight hundred papers were submitted by individual members, in addition to shorter communications in the course of discussion, it will be conceded that it is no light task to compress, within the limits of an article like the present, all that one might wish to say. None the less—indeed, all the more—it seems desirable that an attempt should be made to extract from the enormous mass of material the more important features and findings of the meeting.

The Congress was divided for working purposes into four sections, namely—(1) Medical Pathology; (2) Surgical Pathology; (3) Care and Treatment of Children; (4) Care and Treatment of Adults—Social Hygiene.

It will be most convenient for the present purpose if I consider, as in the previous paper, the outcome of the Congress in respect of—I. Pathology, II. Diagnosis, and III. The Prevention and Treatment of Tuberculosis.

I. PATHOLOGY.—There was remarkable unanimity regarding the main etiological factors.

The soil and the seed.—There had been carried forward from the previous Congress this resolution—"That the following question be submitted to the consideration of the next Congress, namely, 'The constitutional conditions of the individual which predispose to tuberculosis, and the means whereby they can be modified.'"

With reference to this question, Professor Robin developed the view that within recent years attention had been too much limited to the pathogenic organism. Were there not indications that the soil was the principal etiological factor which should receive attention? Experiments had proved that the "respiratory exchange" was increased in tuberculous subjects from 25 to 80 per cent. He went on to show that in children of tuberculous parents the "respiratory exchange" was frequently increased, and that alcoholism, overwork, and careless living, conditions which predisposed to tuberculosis, increased the "respiratory exchange." On the other hand, patients subject to arthritic troubles showed a normal or diminished "respiratory exchange," and frequently transmitted to their descendants this characteristic. He stated that there were agents which were capable of reducing "respiratory exchange," and instanced cod-liver oil as reducing it 10 per cent.; arseniate of sodium, 26 per cent.; cacodylate of sodium, 22·8 per cent.; and adrenalin, 13 per cent. While anti-bacterial medicaments were of service, he pressed the view that every effort must be made to improve the soil, so that the bacillus might not become ingrafted upon it. With regard to this, all thoughtful physicians must be in agreement.

The different forms of tubercle bacillus.—Among the moot-points in the pathology of tuberculosis should be included the relation of the different forms of tubercle bacillus. Are the different "types" of bacillus which are described in relation to human, bovine, avian, and cold-blooded tuberculosis, to be regarded as essentially different or variations of the same, dependant on the varying conditions of cultivation, etc.?

The determination of the issue is one of immense practical importance. Consideration of the question entailed the traversing of a number of points raised by Koch at the British Congress. It will be recalled that then Koch advanced the view—(1) That human

tuberculosis cannot be transmitted to cattle, and (2) that, if the human subject be at all susceptible to bovine tuberculosis, the susceptibility is not pronounced, and "the infection of human beings is but a very rare occurrence."[1] It was as a result of this remarkable statement by so eminent an authority that the present Royal Commission on Tuberculosis was appointed.

Contributions to the discussion at Paris were made by Arloing, Courmont, Kossel, Rabinowitsch, Ravenel, and others. General emphasis was laid on the desirability of studying the points of resemblance rather than the points of difference. Such a study seems to lead to the conclusion that the so-called different "types" are really varieties of one and the same species, the variation being due to differences in culture medium, etc. Such variations are traceable in different examples of admittedly human tubercle bacilli. The variations have no fixity. The so-called "human" and "bovine" varieties are most nearly allied, while the "avian" and "cold-blooded" varieties are further removed. Human and bovine varieties, while apparently different under certain conditions, are of the same nature, and inter-transmissible. All warm-blooded vertebrates may be affected by tubercle bacilli of varying virulence. Probably the frequency of the passage of tuberculosis from animal to man is small compared with that of its passage from man to man.

It may be noted that, in this connection, some of the specimens exhibited in the museum were of special interest. Thus, Calmette and Gervais exhibited a series of preparations to show how tuberculosis may be induced in the kid through feeding with tubercle—whether human, bovine, or avian. Thus the lungs of a kid, three months old, which had been fed through an œsophageal tube with food infected by bovine tubercle, showed evidence of tuberculosis. There was similar involvement in the lungs of a kid, three months old, which had been infected through the intestinal tract by the ingestion of milk from its mother—herself the subject of bovine tuberculous affection of the udder. The intestines of a kid, three months old, showed tuberculous lesions induced by the milk of its mother, which had tuberculosis of the udder of human origin. The intestines of another kid showed tuberculous lesions induced by the milk of its mother, which had bovine tuberculosis of the udder. Another kid presented intestinal tuberculosis, induced by the milk of its mother, which had tuberculosis of the udder of avian origin. Many other specimens were of similar interest.

Throughout the discussion there was a striking uniformity of view. After hearing the various contributions, the section came to the following finding, namely: "The Congress, after hearing the *exposé* of the most recent investigations, declares that it is not only indispensable to avoid contagion from man to man, but also

[1] For evidence adduced by Koch, v. *loc. cit.*, *Edin. Med. Journ.*, 1901, September.

to pursue the prophylaxis of bovine tuberculosis, and to continue to take administrative and hygienic measures to avert its possible transmission to our species; and finally, that it is desirable to be on our guard against all forms of animal tuberculosis."

The general finding of the 1905 Congress is thus in favour of the intercommunicability of human and bovine tuberculosis, and, in this sense, is at variance with the views emitted by Koch at the British Congress on Tuberculosis four years ago.

It should be kept in mind, however, that in enunciating his conclusions in 1901, Koch did not affect absolute certainty in the matter. Even regarding the inoculability of animals with products from human tuberculosis, Koch indicated the need for a repetition of his experiments. As to the passage of bovine tuberculosis to man, Koch admitted freely that the last word had not been spoken. The conclusion of the present Congress, it may be noted, is in agreement with the preliminary report of the Royal Commission presently sitting on the subject.

Relations of "acid-fast" bacilli.—The existence of certain bacilli which closely resemble the tubercle bacillus morphologically and tinctorially, is well known, *e.g.*, the *Timothy bacillus*, *Butter bacillus*, etc. Culture differences have been generally counted on as separating the latter from tubercle bacillus. Doubt was raised on the point by Courmont, who stated that homogeneous cultures of tubercle bacillus resembled closely cultures of the other acid-fast bacilli. Even the results of inoculation seemed sometimes insufficient to separate the two. For while inoculation with acid-fast bacilli seldom produced results comparable with those following inoculation by tubercle bacilli, yet inoculation by means of homogeneous cultures of the latter produced little more than did inoculation with other acid-fast bacilli. Observation seemed rather to point to the identity of such bacilli. At least no essential difference could be predicated. It seemed impossible to prove convincingly that certain acid-fast bacilli were not saprophytic tubercle bacilli, or that the former might not acquire, under certain conditions, the pathogenic and other properties of the accepted tubercle bacillus. An attempt was made by certain observers to distinguish between true acid-fast bacilli which preserve their characters under varying conditions of culture and transmission, and bacilli which have acquired acid-fast characters during a single generation. Such pseudo-acid-fast bacilli resist decoloration to a much less degree than does true tubercle bacillus.

Influence of alcohol.—The prevailing clinical view—especially among French physicians—seems to be that alcohol predisposes to tuberculosis. This view was influentially supported by Brouardel at the British Congress on Tuberculosis. In the previous article regarding the London Congress (September 1901), certain doubts were raised on this point from the clinical side.

These doubts have been confirmed by prolonged observation. At certain stages of tuberculosis and in certain individuals, the measured use of alcohol must be admitted as serviceable. The severe strictures regarding the effect of alcohol have reference chiefly to its excessive use and the admitted influence of such abuse in the production of poverty and want. Recent experimental observations by Roos, Mircoli, and Gervino have tended to show that alcohol is without effect on tuberculosis, or may indeed increase the resistance of animals to inoculation. These conclusions were, however, traversed by the results of observations submitted to the Congress by Achard and Gaillard, who conclude that the continued exhibition of alcohol—whether subcutaneously or by ingestion—accelerates the progress of tuberculosis.

II. Diagnosis.—Three special reports were submitted to the Congress on this part of the subject. A good deal of well-worn ground was gone over, and the statements rather lacked crispness. It must be confessed that they contributed little that was either fresh or suggestive.

It was rightly urged that, after all, the diagnosis of pulmonary tuberculosis must rest in large part on the delicate appreciation of a number of fine points which can only be achieved as the result of prolonged training and patient observation. Attention was drawn once more to subtle changes in the appearance of the individual, and to certain symptoms, the exact value of which can hardly be gauged save after much experience.

The significance of slight variations of temperature was emphasised. The subject of tuberculous disease becomes a much more sensitive recorder of a variety of influences[1]—such, for example, as exercise, fatigue, and other nerve exhaustion. The effects of these tend infallibly to register themselves in a greater or less degree of pyrexia. Acceleration of pulse rate—with or without elevation of temperature—is similarly a sign of much diagnostic import.

An attempt was made by some to lay stress on the estimation of "respiratory exchange." The general sense of the meeting was that such changes differed in no important way from those in normal or slightly febrile individuals. Meantime, the methods of estimation are somewhat cumbrous. Attention was also drawn to the significance of rapid muscular wasting in relation to early cases, more particularly wasting of the scapulo-thoracic muscles. Such local wasting of thoracic muscles is a point which has received too little consideration at the hands of clinicians. For my part, I regard the advance of this and the commonly associated symptom of increased myotatic irritability both of diagnostic and prognostic value.

It may be feared that in these days of laboratory investigation, *physical signs* have seemed to take a less important place than

[1] *Practitioner*, London, 1902, May.

they used to hold in the diagnosis of pulmonary tuberculosis. If this be so, the Congress, through the mouth of some of its leading speakers, has done good by emphasising the extreme importance of these as compared with other methods. Curiously enough, the rôle of percussion in the early diagnosis of the disease was passed lightly over. Indeed, by some it was spoken of slightingly in contrast with the value of auscultation. This surely is a great mistake. Elsewhere [1] I have elaborated my views on this subject. For the present it is sufficient to reiterate that the more skilled the observer becomes in the refinements of percussion, the more satisfied will he be as to the significance of the method in the detection of the earliest changes.

There is an enormous difference between the diagnosis of truly early pulmonary tuberculosis and the diagnosis of an established case. The citation of Röntgen rays as affording much beyond corroborative—often strikingly corroborative—and possibly more detailed evidence of the presence of tuberculosis, suggests an inability to grasp the delicacy of the issue. It may be fairly asserted that when changes are determinable by Röntgen rays, the condition is no longer quite an early one. The views emitted at the Congress corroborate the statement already made that "in estimating the diagnostic value of the Röntgen rays, much depends necessarily on the relative skill of observers in the use of different methods. It is astounding how apparently obvious physical signs may be passed over by good observers. It is therefore difficult to compare rigidly the results determined by the earlier physical methods and those obtainable by Röntgen ray method. None the less is it true that Röntgen ray illumination affords important aid." [2]

Tuberculin.—It seems inconceivable that the use of tuberculin as a means of diagnosis is still discussed in a hesitating and almost apologetic fashion. For there can be little doubt that tuberculin—in hands accustomed to its use—affords one of the subtlest tests of the presence of tuberculosis in the earliest stage. I confess that it is difficult to understand the statements which are repeatedly made as to the uncertainty and risks of the procedure. Whenever tuberculin is mentioned in some quarters, capital is at once made against it by the citation of this alleged uncertainty and risk. But do they really exist? For the past fifteen years I have regularly used tuberculin in one or other form for the purpose of diagnosis in all truly doubtful cases. The results have been all that could be wished. The method is, of course, not required in cases where other conclusive tests are available. Several members of the Congress, notably Moeller, gave corroborative evidence as to its value on the lines already indicated His method coincides with that which I use regularly—namely, to administer one-fifth of a milligramme (in children and highly

[1] *Practitioner*, London, 1903, January.
[2] "Tuberculosis of Lung," *Encyc. Med.*, vol. vii. p. 119.

delicate patients half the quantity). Where no reaction occurs, the dose is repeated at several days' interval for three or four times. If then no reaction has occurred, the condition may be assumed as probably non-tuberculous. It is sometimes advantageous to repeat the process after an interval of a month or two.

Cyto-diagnosis and agglutination.—No new facts were contributed in relation to this point. There was a general agreement as to the significance of cyto-diagnosis in relation to pleural effusions—the presence of an excess of lymphocytes pointing to the tuberculous origin of the pleurisy.

III. Prevention and Treatment.—*The rôle of sanatoria and dispensaries.*—Much discussion took place on this subject. With regard to sanatoria, while the opinion was expressed in some quarters that they are of slight utility, there was a general agreement that they do play an important part in relation to the treatment of certain patients. If the results are not so uniformly good as might be desired, yet a sufficiency of complete and "economic" cures are effected. The results would be infinitely better if there was a more complete understanding as to what constitutes an early and suitable case. In too many instances sanatoria simply serve the purpose of isolation hospitals. This is not as it should be. Isolation hospitals for advanced cases are most desirable in all large centres, from the point of view of prevention; but the sanatorium should be concerned chiefly with the effective arrest of the disease. From the educational point of view, that is, with a view to the instruction of patients, and indeed of the community generally, how to treat themselves, the sanatorium plays an important part. Nevertheless, it is to be feared that the foundation of sanatoria has bulked too much in most local movements against tuberculosis. The outlook of the sanatorium is necessarily limited to the recovery of a certain proportion of early cases. After all, the cure of even a large number of selected cases contributes little towards the extermination of tuberculosis. There was general agreement that sanatoria should be built as simply, and with as little luxury, as possible.

The function of the dispensary is different, and in some respects larger, than that of the sanatorium. A well-regulated dispensary should be the centre of information on all points regarding tuberculosis. It should keep systematic records regarding the individual patients, who should not only be treated, but should be visited at home by the dispensary staff, with a view to the inspection of the dwelling-house and the determination of the patient's surroundings and conditions of life. It should disseminate instruction as to how patients should manage themselves, and so prevent the risk of infection to others. It should dispense, not merely medicines, but disinfectants, sputum bottles, and, in certain cases, food-stuffs and the like. It should undertake the disinfection of dwellings and clothing, both during and at the close of illnesses,

and after death from tuberculosis. It should select suitable cases for sanatorium treatment, and also for isolation hospitals. It should be a general bureau of inquiry on every branch of the subject.

The need for a completer organisation against tuberculosis on the part of local authorities—municipalities, parish councils, and the like—was urged by myself, and the view seemed to meet with considerable favour. The extent of the issue seems to demand that each city and district should have a special department of public health activity devoted entirely to the handling of tuberculosis in all its manifestations. In cities the department would be municipal, naturally under the direction of the medical officer of health. It should, however, constitute a separate and well-defined department of his activity. The department should include the following divisions, which should stand to each other in close relationship:—(1) A tuberculosis dispensary, or dispensaries, according to the size of the town; (2) a sanatorium, or sanatoria, for selected patients, with a view to the arrest of the disease; (3) an isolation hospital for patients in advanced stages of the disease; (4) where possible, an after-care colony for the supervision of patients in whom a sufficient cure had been attained to make open-air employment feasible, but who would lapse again if not thus supervised for a considerable time.

The Congress determined with practical unanimity that the establishment of tuberculous dispensaries and sanatoria was sound in principle, both from the point of view of prophylaxis and relief of distress, and that it was important that the functions of those establishments should, as far as possible, be made to harmonise in a general scheme connecting them with each other and placing them in relation with allied institutions. It was recognised that the advantage of bringing them into relationship with the Public Health Department was immense, as thereby linking this more specialised agency with the fundamental methods of better sanitation, more especially the improvement of dwelling-houses and the prevention of overcrowding.

Institutional treatment and its relation to death-rate.—In this connection an interesting and significant communication was made by Newsholme in the form of "A Study of the Relation between the Treatment of Consumptive Patients in general Institutions, and the Reduction in the Death-rate from Tuberculosis," which went to show that the substitution of indoor for outdoor treatment had been one of the most important factors in the decrease of mortality from tuberculosis. The paper contained a most careful analysis of all the figures available. While the data are necessarily incomplete, they seem to justify the conclusion that in proportion as the treatment of consumption in institutions increases, the death-rate from tuberculosis falls. In other words, where institutional treatment, whether in sanatorium, hospital, or poorhouse, has been

extended, the death-rate from tuberculosis has fallen. On the contrary, it seems that where treatment has been limited to outdoor relief, the death-rate has either risen or at least not fallen.

Notification.—The vexed question of notification came up for review. Many members of the Congress seemed to share the view, which has been my own for many years, that notification of tuberculosis affords the most sound and logical solution of the tuberculosis problem. The oft-quoted experiences of New York, where compulsory notification has been in use since 1897, were again in evidence. The opinion was once more voiced that the supposed disadvantages of notification had been unnecessarily exaggerated. After discussion, the meeting adopted the following conclusion unanimously, namely: "That it is desirable that it should be the general practice to notify all cases of advanced tuberculosis."

Disinfection.—The consideration of notification was associated with discussion as to disinfection of dwellings. The general view was expressed that disinfection is imperative wherever a case of tuberculosis has occurred. Disinfection should be practised not merely after the death of the patient, but also at various intervals during the progress of the disease. The meeting came to a general finding to the effect that the means of disinfection to be insisted on in cases of advanced tuberculosis should be in keeping with the methods which had been found most effective, and that local regulations or legislative enactments should be framed to ensure the practice of such disinfection.

The relation of insurance and benefit societies to tuberculosis.—Three special reports were submitted with reference to this subject. The first, by Privy Councillor Bielefeldt, is of special interest, as indicating what an important part is played by the system of compulsory insurance in the fight against tuberculosis in Germany. Indeed, he regards it as by far the most important agent. The insurance associations provide medical assistance, drugs, and other help to their policy-holders, including hospital or sanatorium treatment for suitable consumptive patients. Since the year 1897 such insurance societies throughout Germany have maintained no fewer than 101,806 tuberculous patients, at special establishments, for a period amounting in all to 7,687,805 days, at a cost of almost £2,000,000. Of these, 85,000 were sent to special sanatoria or hospitals for tuberculosis, and 9000 to the best-known health resorts both of Germany and other countries. The results have certainly been remarkable. Thus, the percentage of patients who five years after treatment were still well able to work and had not required any sick allowance from their insurance funds, amounted to 27, 31, 32, and 31 for the years 1897, 1898, 1899, and 1900 respectively. The insurance societies have spent £10,550,000 in building sanatoria and £6,650,000 in building workmen's houses. With this Bielefeldt associates the striking fall in the mortality

from tuberculosis throughout Prussia, namely, from 88,283 deaths in 1886 to 66,726 deaths in 1902. Throughout the German empire, in cities of more than 100,000 inhabitants, the mortality per 10,000 has fallen from 37·36 in 1886 to 22 in 1902.

Fuster argued likewise that the general preventive measures taken by public authorities should be completed by workmen's insurance against sickness and disability resulting from sickness. Such insurance should not confine itself to the provision of sick money, but should aim at being preventive. He was of opinion that a law for compulsory insurance was indispensable.

From the English side it was pointed out that in this country neither insurance companies nor benefit societies had as yet associated themselves actively in the struggle against tuberculosis. Several friendly societies had shown that those of their members who suffered from tuberculosis were more expensive than all the other members, to the extent of £14 to 17 guineas per head.

After a good deal of discussion, the meeting adopted the following motions:—1. It is desirable that measures of general prophylaxis and of poor relief should be completed by a system of insurance, to which the parties insured, their employers, and the State should each contribute. 2. It is desirable that "invalidity," which, as a rule, is but a prolongation of illness, should be protected by the same insurance organisations as those which deal with sickness. 3. This insurance should not have for its sole purpose the payment of sick allowances, but its action should above all be preventive: works of sanitary improvement and the treatment of the sick should form part of its functions.

Curative measures. Tuberculins and sera.—Attention is naturally focussed first on the announcement by von Behring to the effect that he had been occupied during the past two years with what he believed certainly would prove a curative principle in relation to tuberculosis.

Proceeding on the lines of Metchnikoff's researches on phagocytosis, von Behring's conception is the establishment of a cellular immunity, rather than an antitoxic humoral immunity. This is effected by the impregnation of the living cells of the organism by a substance emanating from the virus of tuberculosis which he terms TC. When this TC has become incorporated with the cells of animals treated by it, and has been metamorphosed by the cells, TC becomes TX.

This TC or TX, as existing in the tubercle bacillus, plays the part of a formative substance, and also possesses fermentative and catalytic properties. It has a selective action with regard to other substances, and under certain conditions possesses assimilating qualities. It represents the so-called vital principle of the bacillus. In the process of immunisation of cattle against tuberculosis (von Behring's bovovaccine), von Behring thinks that the TC is freed from other substances, and exercises a specific action on the tissue

cells, especially those of the germ centres of lymphatic tissue. Probably the TC is the cause of hyper-sensibility to Koch's tuberculin, and of the protective reaction against tuberculosis.

In the establishment of immunisation the elaboration of TC plays a large part. But such elaboration is a long and dangerous process for the organism. Von Behring's hope is to save the organism the trouble, by the preparation of TC *in vitro*. Thereby he hopes to substitute active immunisation for passive immunisation. Certain substances of tubercle bacillary origin hinder the therapeutic activity of the TC. The aim of much of von Behring's researches is to free the TC from these. He recognises three groups of such bacillary substances—(1) A substance, TV, only soluble in pure water, and possessing a fermentative and catalytic action. To this subject are due the toxic effects of Koch's tuberculin. 1 grm. of dry TV is more toxic than a litre of Koch's original tuberculin. (2) Globulin, TGL, only soluble in neutral saline solutions, and also toxic. (3) Several non-toxic substances, only soluble in alcohol, ether, chloroform, etc.

The rest bacillus, that is the tubercle bacillus freed from these three groups of substances, retains the form and staining reactions of the tubercle bacillus. It can be transformed (by means not described) into an amorphous substance readily taken up by the lymphatic cells of a variety of animals, *e.g.*, guinea-pig, rabbit, sheep, goat, ox, and horse. The substance is in turn transformed by the cells of these animals. The cells are rendered oxyphile or eosinophile, and coincidently there is established, in the organism as a whole, immunity to the tubercle bacillus.

It is of special interest that this TC—though it is incapable of reproduction—possesses the power of giving origin to a special form of tubercle corresponding to that described by Laennec as "granulation tuberculeuse"—a structure which neither caseates nor softens. Von Behring believes he has been able to separate this TC *in vitro* in a form which can be applied efficaciously and without risk for therapeutic purposes, to the human subject.

Von Behring desiderates fuller investigation, both from the pathological and the clinical side, before he announces to the world the details of his method. He emphasises the failure of previous researches in a like direction, citing Koch's old tuberculin and TR, and Maragliano's and Marmorek's serum. He seems to have in view the establishment of check observations on the part of other laboratory workers, and also a series of careful clinical observations, before he goes into further particulars. The earlier stages of his research are to be explained in a forthcoming work, to be entitled "Modern Problems of Phthisiogenic and Phthisiotherapeutic Physiology Enlightened by History."

The reserve and caution suggested by this proposal for delay are commendable. Those who are familiar with the difficulties which attend such a research, both from the pathological and

clinical side, will readily accede all that is claimed. But the pity is that the necessary time for complete research and critical re-examination should not have been taken before a single word was emitted about the matter, especially to an audience which included many lay persons.

As things stand at present, it is to be feared that in the interval between the announcement and complete publication a large part both of the scientific and lay public will be tempted to hang around in expectant curiosity, rather than use and develop the effective means of treatment already lying to their hand. It is awkward for the credit of such Congresses, that they seem apt to be used as occasions to exploit in advance incomplete investigations. This is thoroughly wrong, however important the investigations may promise to become, or however distinguished the worker. The Berlin Congress of 1890, the British Congress of 1901, and the Paris Congress of October last, have this unfortunate feature in common. Recollections of the outcome of the two former announcements make us, in respect of the present, breathe the prayer, *Absit omen.*

Several contributions were made favourable to Koch's tuberculins—both the original and the later TR—as curative agents. Of their therapeutic value there can be no manner of doubt. The pity is that whenever the subject is broached there is usually presented a *réchauffé* of the old arguments which served to damn the method when it was first introduced, and the agent, badly understood, was consequently used heedlessly in unsuitable cases.

Of special interest in this connection was a communication by Béraneck on a new tuberculin, to the preparation of which he has devoted several years. This tuberculin differs from Koch's preparations in several respects. The fluid contains—(1) Extra-cellular toxins, TB (toxines-bouillons), which Béraneck obtains from a culture of tubercle bacillus on a special medium free of peptones. The solution contains a peculiar florescent substance. Administered to tuberculised guinea-pigs, it produces a pyrexic reaction, but its toxic action is slight. (2) Intra-cellular toxins, AT (acido-toxines), abstracted from the bodies of tubercle bacilli by means of ortho-phosphoric acid (1 per cent.). These acido-toxines give proteid reactions. They are completely different from the nucleo-proteids already separated from the bodies of tubercle bacilli. They are relatively of slight toxicity.

Each of the two constituent elements possesses a certain immunising power. The maximum of immunisation is obtained by a combination of TB and AT. The combined product constitutes Béraneck's tuberculin, which, although only slightly toxic, has marked bactericidal properties. Béraneck's tuberculin is employed both subcutaneously and by direct injection into the tuberculous focus—for example, joints, glands, etc. Béraneck believes that, brought thus directly into contact with the tuber-

culous lesions, it determines an active phagocytosis, and probably frees bacteriolytic products contained in the phagocytes. Favourable results are produced more quickly by local injection than when the tuberculin is used subcutaneously, more especially in closed tuberculosis, where, it may be supposed, tubercle bacillus is alone present.

Béraneck's communication was restricted to the more scientific aspect of the matter. Clinical evidence in support of his thesis was submitted by himself and other observers. Owing to the arrangements of the Congress, it was unfortunately out of my power to contribute to the discussion. I mention this because it was my purpose to have expressed the opinion, based on an experience of eighteen months, and of more than fifty cases, that in this new tuberculin we have an agent of great value in the treatment of all forms of tuberculous disease. The tuberculin is likewise of diagnostic value.

Sera.—The subject of sera was similarly discussed. Marmorek reported as to results of treatment by means of his serum, which he maintained had been submitted to very severe tests. The results included chiefly, amelioration of symptoms, and decrease in the number of bacilli present in the sputum, and, in some cases, entire disappearance of bacilli. It was exceptional to find no amelioration. The cases in which definite relief was obtained amounted to about three-fourths of the whole. The results were stated to be still more encouraging in surgical cases. The serum had proved effective, both when used subcutaneously and per rectum. Most of the members who had had an opportunity of using the serum contented themselves with statements that its use had been followed by marked amelioration in most cases, and that there appeared to be no serious risk in the method.

Diet.—A number of papers were contributed on the subject of diet in tuberculosis. There was manifested a general belief that the principle of over-feeding contains elements of danger. Discretion is needed in the selection of a dietary and in the determination of the amount. Doubt was raised as to the wisdom of pressing fatty stuffs to excess. Several communications were made pointing to the significance of a highly nitrogenous dietary, more particularly as to the value of raw meat (zomotherapy). The remarkable researches of Richet and Héricourt were quoted. More recent observations go to show that alimentation by raw meat produces an increased absorption of nitrogen, an improvement in intestinal metabolism, an increase in hæmoglobin, and an increase in digestive leucocytosis (Galbraith). Clinically, such alimentation leads to remarkable improvement in the general condition, muscular vigour, circulation, blood, digestion, temperature, weight, and local lesions. The view was urged that the method was strictly a therapeutic procedure, and that, to be effective, zomotherapy must be systematic and regular.

Treatment of lupus.—The treatment of lupus came up for special discussion. There was expressed a general feeling that the older methods of treatment, such as scarification, the galvano-cautery, etc., had not been entirely displaced by the newer lines of treatment; and further, that cases occurred from time to time which were not affected favourably, either by the older or the more recent methods. A considerable amount of testimony was submitted as to the value of phototherapy. Malcolm Morris, for example, indicated that the Light treatment had in his hands produced results on the whole superior to those obtained by any other method. It is, of course, specially favourable where the disease is limited and comparatively superficial. The results of treatment by Light are much more satisfactory than those obtained by the older method, and minimise cicatricial deformity. The Röntgen rays seem of greater value when the disease is extensive, as the rays can be applied to a large area at once. Where mucous membranes are involved, X-rays are of especial service, and also when recurrence takes place after a temporary cure by Light treatment. Further, X-rays are more serviceable than photo-therapy when there is much ulceration. The older methods of treatment, as by salicylic acid, pyrogallic acid, carbolic acid, nitrate of silver, etc., are still sometimes valuable in supplement of more recent methods. It appears sometimes to be serviceable to begin treatment by such caustic methods. They seem to prepare the way for the influence of the others.

Surgical treatment of cerebral tuberculosis. — The most important discussion from the surgical point of view was that concerning the treatment of cerebral tuberculosis.

1. *Tuberculous meningitis.*—The significance of early lumbar puncture was emphasised, the view being expressed by Duret that the cerebro-spinal fluid in such cases did not only act by mechanical distention, but as a baciliferous and toxic agent. By its means there occurred dissemination of bacilli and their toxin throughout the nerve centres. Evacuation of fluid therefore leads to a positive reduction of toxic influence. The hope was expressed that, although up to the present operative interference had been of little service, surgical procedure might yet be improved whereby favourable results similar to those obtained in traumatic and other non-tuberculous forms of meningitis. There seems more likelihood of success in cases of *localised* tuberculous affection of the meninges.

2. *Tuberculomata.*—Good results were communicated as to removal of solitary tuberculomata. Duret cited twenty-four such operations on the hemispheres and twelve on the cerebellum. Of these he reckoned twenty-three operative successes, while in eleven cases death had followed. With three exceptions, all the successes were in relation to the cerebral hemispheres, and almost exclusively the motor areas. Nearly all operations on the cerebellum

had been followed by rapid death. Of the successful cases, the cure had continued for varying periods of from one to eight years. As the result of his statistics, Duret concluded that operation for the removal of cerebral tuberculomata is justified in the absence of symptoms of advanced or generalised tuberculosis. In children especially, the possibility of multiple tuberculomata must be kept in view. In adults, tuberculous tumours are more commonly solitary.

The care of children.—Although an entire section was devoted to the consideration of the care and treatment of children, there was contributed little that was very fresh or of outstanding importance. The necessity of a healthy family life, with a sufficient dietary, free exposure to open air, and gymnastics, was rightly emphasised, as were the dangers of school life, including overcrowding of classrooms, inadequate ventilation, dirt and dust, and the presence of infected persons, whether teachers or pupils. The view was definitely urged that physicians should be appointed in relation to every public school, or other teaching institution, for the purpose of periodically inspecting the pupils, the state of the classrooms, and the system of education. Regulations or enactments should be framed prohibiting children affected with tuberculosis from continuing attendance at ordinary schools. Having regard to the number of such children, it seems worthy of consideration whether special schools on more physiological lines should not be provided for them.

ON PSYCHOCHROMÆSTHESIA AND CERTAIN SYNÆSTHESIÆ.

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Part I.—Historical.
Part II.—Account of my own psychochromæsthesia and that of my brother (A. F. H.).
Part III.—Suggested origin of coloured concepts.
Part IV.—Psychochromæsthesia due to functional inertia.

I desire in the compass of a short paper to put on record, as systematically and fully as is necessary, certain invariable associations between colours and concepts which I and one of my brothers experience. I make this communication as contributing to the data of an obscure but very interesting subject, rather than as an exhaustive account, either historical or critical, of the synæsthesiæ.

Part I. Historical.—Perhaps "Locke's blind man," to whom "scarlet" was "like the sound of a trumpet," is the earliest case

in literature ([1]) of one of the synæsthesiæ. The case of the two brothers Nüssbaumer, published in 1873, is the next in point of time of which I have any record: it is quoted by G. H. Lewes in his "Problems of Life and Mind" ([2]). These men experienced invariable associations between sounds and colours. Voices and certain musical tones aroused particular colours, and, conversely, certain colours called up certain definite sounds. The two brothers experienced very much the same colours in their synæsthesiæ: there were more resemblances than differences. Blue, yellow, brown, and violet were the colours oftenest aroused; black, white, red, and green were never experienced. Even in their dreams these double sensations were present: thus a loud noise gave rise in the dream to the same colour which that particular sound, *e.g.* beat of drum, would have given rise to in the waking state.

Technical terms in connection with these associations were first introduced by Francis Galton, in the chapter on the subject in his "Inquiries into Human Faculty and its Development" ([6]). By a "psychochrome" he designates the subjective (mental) association between a sensation and a colour, or between a concept and a colour: the auditory case of the former is sometimes known as "coloured hearing," or "l'audition colorée" ([8], [9], [10]); for the latter I suggest the term "psychochromæsthesia." Galton uses the term "psychogram" to describe the visualising or "exteriorising" of a mental image, as, *e.g.*, when a particular number, 8, is read or heard spoken of, the outline of the 8 seems "projected outwards," is thought of, as to its form, very definitely, even more definitely than when a mathematician forms a mental picture of a square or circle. A psychogram may, of course, consist of a whole word similarly visualised as though written or printed before the percipient, and the figure so projected may or may not appear coloured.

Galton terms "seers" all persons who visualise forms of figures, letters, or whole words, whether coloured or not; all other persons are "non-seers." Galton found that in the ranks of seers both men and women were to be found, and that such persons were, as a rule, rather above than below the intellectual average. The following gentlemen are named as seers:—Baron von Osten Sacken, the entomologist; George Bidder, Esq., Q.C.; Dr. James Key, Cape Colony; the Rev. G. Henslow, botanist; Mr. Schuster, F.R.S.; B. Woods Smith, Esq.; Colonel Yule, C.B.

From a survey of the accounts given by seers of their own mental experiences, we can summarise the following as characteristic:—

1. These associations are formed at a very early age. Galton's correspondents frequently wrote, "Ever since childhood I have always seen," etc.

2. These associations are "very little modified by the accidents of education."

3. They are markedly individualistic, *i.e.* the particular colour habitually associated with a sensation or concept in one person is by no means the same as the colour of the corresponding psychogram in some other seer. There is nothing like even a general agreement between the colours attached to the same concepts in the minds of undoubted seers.

4. The majority of seers are able to describe with great minuteness the tone of the colour associated. They are not satisfied with saying red or blue; they can tell you the precise tone, tint, or shade of red or blue, as the case may be.

5. Psychochromæsthesia is "very hereditary."

Galton published as coloured diagrams and charts the representations of some of these chromo-psychograms.[1]

In 1891, Mr. Edward S. Holden, in a letter to *Nature* ([7]), gave a detailed account of the psychochromes of his daughter as they appeared to her at 7, 8, 10½, 13, 14½, and 16½ years of age respectively. Holden's attention was drawn to the subject by reading a paper of Galton's ([3]). He discovered his own "inability to visualise numerals or anything else," but found out that Professor Owen of the University of Wisconsin and his own daughter Mildred were seers. Professor Owen had since a boy conceived of vowel-sounds as having colour, and the child Holden at 7 years old was found to have quite definite colours for the days of the week. A number of her psychochromes are published in the appendix to this paper.

The hereditary character of "coloured hearing" was still further illustrated in a paper, "Un cas héréditaire d'Audition colorée," of which an abstract appeared ([8]). A father, his son and daughter, each associated the hearing of the names of letters of the alphabet with definite colours; with vowels they associated "gay" colours, with consonants shades of grey. But the father and the son did not associate the same colour with, *e.g.*, a given vowel-sound. All these seers associated colours with *thoughts* of the letters of the alphabet, that is to say, had psychochromes.

In 1889, Professor Pietro Albertoni of Bologna communicated an interesting paper, entitled "Ueber Beziehungen zwischen Farben und Tönen" ([9]). He described the curious association present in the minds of certain persons between musical tones and colours in the spectrum; thus C (*do*) was always associated with blue, E (*mi*) with yellow, and G (*sol*) with red. Albertoni found two red colour-blind persons who were quite unable correctly to name the note G, a condition he names "Gehördaltonismus,"

[1] By Synæsthesiæ I understand coupled sensations, as when sounds, voices, etc., arouse colour (*e.g.*, "coloured hearing").

By Psychochromæsthesia I mean coloured conception. A coloured concept is a psychochrome; when, in the case of a coloured concept, the exteriorising is *the* feature, this may be called a chromo-psychogram.

or Daltonismus auditivus—a psychical deafness in consequence of, or depending on, red-blindness.

The latest contribution to this subject is by Monsieur E. Peillaube ([10]), who reports on the coloured hearing of four persons to whom the vowel-sounds had colour (synæsthesia), and who examines in detail the coloured auditions of a Monsieur Ch——, to whom high musical tones have a green colour, and low tones a violet. Peillaube calls attention to certain cases in musicians of definite associations between not only notes, musical instruments, and colours, but between whole pieces of music and colours. Gounod, endeavouring to express the difference between French and Italian, and his preference for the former, uses a language of colours: "Elle est moins riche de coloris, soit, mais elle est plus variée et plus fines de tintes."

As most of Peillaube's paper is taken up with suggestions as to the cause or origin of this synæsthesia (coloured hearing), I shall postpone further reference to it until I take up the theoretical aspect of psychochromæsthesia.

Part II. Description of my own Colour Associations and those of my Brother.—Ever since I can remember, my mental images have been coloured. My memory is a decidedly visual one; and whenever I call up the image of anything so distinctly that it wholly engages attention for the time being, I always find the image can be described as black, white, grey, or some nameable but not always spectral colour. Arithmetical figures, letters of the alphabet, and words have, in mental representation, more or less of chromatic character.

The majority of people who are not "seers" have, I find, some difficulty in understanding what is present to consciousness in these psychochromes. The most careful introspection in my own case shows that the letter, figure, or word is visualised as written (more rarely printed) in a coloured ink on a greyish background. Some of the colours are pale tints, *e.g.*, the yellow of *f* and *g*; others are shades, *e.g.*, of red in the case of *l*, *m*, and *n*, which are brown. White or black words are rather more vivid than coloured words, but it is a white or black rendered faint, as by distance, or by a feeble illumination. Any *word*, if sufficiently pondered over —exteriorised—becomes associated with a colour-tone. Not, of course, that every word in ordinary conversation is to me the source of a chromo-psychogram, but that if I call up before the "inward vision" any word whatever, and think intently of it as a word written or printed, it appears of some definite colour; the more I visualise it, the more distinctly does it seem coloured.

There is not in my case any association between a pure tone (as emitted, *e.g.*, by a musical instrument or the human larynx) and colour. No synæsthesia is here, as in Albertoni's cases; nothing analogous to Locke's blind man, to whom "scarlet" was

"like the sound of a trumpet," and presumably the sound of a trumpet like scarlet.

It seems to me that in my case, colour is aroused when not the sensation but the *concept* becomes the more definite; which is what I mean by distinguishing between synæsthesia (such as coloured hearing) and psychochromæsthesia (coloured conception) [whence a psychochrome or coloured concept].

Reference may be made to the tables given at the end of this paper for the particular colours invariably associated with certain concepts: the "colours" in my case are—Black, white, grey, brown, red, green, yellow, blue. Introspection shows that though the colours associated with concepts are involuntary and invariable, they are not obtrusive, and never reach the intensity of hallucinations of colour.

From a very early age one of my brothers (A. F. H.) has also experienced these invariable associations which, as far as they go, are similar to mine; but whereas we both associate colour with the names of the days of the week, and with those of the months, my brother has no psychochromes for the individual letters of the alphabet. This is all the more remarkable as almost all seers reported on, from Galton's earliest paper onwards, have colour-associations in connection with at least the vowels. In the case of both of us, the names of the colours themselves have, as might be expected, the colours they indicate—the word yellow is yellow, green green, and so on.

Further, it may be noted in my case that the colour of a word is not the colour which would be formed by the compounding of the real colours of its constituent letters. Thus in Tuesday; *t* is blue-black, *u* grey, *e* brown, *s* yellow, *d* brown, *a* white, *y* yellow: these colours mixed or added together would not yield the white of the psychochrome "Tuesday."

Or, again, in "green:" *g* is yellow, *r* black, *e* brown, *n* dark brown, which colours could not possibly yield green.

That my own case was a typical one of psychochromæsthesia, I discovered not only on comparing it with the published reports of coloured visualisings, but after corresponding on this subject with Mr. Francis Galton some ten years ago. My case is typical in the following respects:—

1. The very early date at which these associations of colours with concepts must have been formed. "Ever since I can remember," I can say as truly as the rest of the seers can.

2. The definite character of the colours associated: *g* is to me distinctly of a canary-yellow tint, *r* is a dull black, *l*, *m*, and *n* are dark brown. I am as fastidious as any seer as to the precise tint or shade of colour experienced, and could be as precise as any one with regard to matching the colours objectively.

3. I have, with the most of seers, the power of seeing the vowels coloured, not, however, as a synæsthesia, but as a coloured concept.

4. My case illustrates the point noticed by Galton, namely, that this faculty is not altered, far less abolished, by the accidents of subsequent education. My psychochromes have proved remarkably stable.

5. As to the hereditary character of my psychochromæsthesia, I have not sufficient data for a definite statement. Neither of my parents has the faculty, and I have no information as to its existence in grandparents or more remote ancestors. One of my brother's children, though only 7 years old, has well-marked psychochromes for the days of the week and the hours of the day.

6. Individualistic character of the colours: no general agreement with colours of other seers.

Whereas in my own case, the particular colour for a given concept has never altered, Friday has been brown, Saturday white-grey, Monday yellow, ever since I first thought of these words at all, in the case of Miss Holden there have been a few colour changes as the years went on ([7]). Thus the numeral 9 was green in 1885, blue in 1887, bluish green in 1889, and dark blue in 1891.

Scrutiny of the psychochromes, in this latter case, shows that the changes have not been at all marked or fundamental: in one case from a yellow to a "cream" colour, in another from crimson to pink, and again from white to "cream" colour. The general impression derived from a survey of these colours is the surprisingly little change there was between 10½ and 16½ years of age. Scrutiny of the tables exemplifies very well the notorious non-agreement as to the colour of a particular psychochrome: thus the vowel *a* is for me grey-white, for Miss Holden "yellow, later cream," for four of the subjects reported on by Monsieur Peillaube black, brown, blue, and green respectively; again, Tuesday is for me white, for A. F. H. black, for Miss Holden pink. As far as I can ascertain, the colour "orange" seems the least in favour with psychochromæsthetes: it does not occur at all in my case, nor in my brother's.

As to the relative frequency of occurrence of a colour, I have made the following estimations from our psychochromes: taking fifty of these, it is found that—

White or grey occurs for D. F. H. to extent of 28 per cent.; for A. F. H. 24 per cent.

Brown occurs for D. F. H. to extent of 26 per cent.; for A. F. H. 24 per cent.

Black occurs for D. F. H. to extent of 14 per cent.; for A. F. H. 16 per cent.

Yellow occurs for D. F. H. to extent of 22 per cent.; for A. F. H. 12 per cent.

Red occurs for D. F. H. to extent of 4 per cent.; for A. F. H. 4 per cent.

Green occurs for D. F. H. to extent of 2 per cent.; for A. F. H. 10 per cent.
Blue occurs for D. F. H. to extent of 2 per cent.; for A. F. H. 4 per cent.
Violet and indigo-blue and purple occur but rarely.

PART III. SUGGESTED ORIGIN OF COLOURED CONCEPTS.—I have perhaps now analysed the facts sufficiently carefully to allow me to proceed to one or two considerations of a theoretical nature. First, what is the cause or origin of this faculty of psychochromæsthesia? and secondly, what is the biological significance, if any, of the mental condition?

I believe that the case so carefully analysed by Peillaube gives an account of the causal factor of psychochromæsthesia. Monsieur Ch—— was fortunately able to apply a searching introspection into his associations of ideas, the success of this self-analysis being *the* valuable feature of Peillaube's paper. To Monsieur Ch——, low notes, such as low notes of the organ, are sweet and deep (*douces et profondes*), the colour violet is also *douce et profonde*, therefore Monsieur Ch—— associates low notes with the colour violet.

Again, to this subject the vowel *u* seems, when pronounced, "sourde," the voice pronouncing it "grave," so that the vowel *u* also becomes thought of as violet.

Once more, the vowel sound of *i* somehow was suggestive of something *vive et gaie*, the colour green also suggested liveliness and gaiety, therefore to Monsieur Ch—— the vowel *i* was green.

These conclusions were reached only after considerable introspective analysis coupled with an excellent memory, for it must be understood that the link between low notes on one hand (x) and the colour violet on the other (y)—the sweetness and deepness—is by no means an explicit or definite presentation in the mind of Monsieur Ch—— at this date. This link, l, was *discovered*, but it is virtually at present a subconscious link between the x and the y.

Peillaube's theory, then, is that these apparently arbitrary and "instantaneous" linkings of colours to concepts are really after all cases of associations of ideas or concepts, x and y, through the intermediation of a third factor, the emotional link l, now subconscious but revivable. Thus the sequence was x-l-y, and l, having long ago dropped out of consciousness, x and y seem to be immediately but indissolubly bound together.

In other words, the existence in the past of some now forgotten emotional or other mental state, is the causal link sought for as associating apparently so arbitrarily a colour with a concept. I believe that in this long past mental state which need not have been emotional, we have the clue to the origin of many psychochromes; my own case seems to illustrate this point also.

The word February is to me white: this apparently arbitrary colouring would seem to have been arrived at thus: the earliest February I can remember was snowy (I was taken into the country on one of the early anniversaries of my birthday, 24th February, on which there was a heavy fall of snow); snow is white, therefore February was ever afterwards white.

March is to me brown: the association must have been somewhat as follows: I must have noticed the appearance of the earth after the whiteness of winter had gone; earth is brown, therefore March came to be brown.

While this explanation suffices for many of my psychochromes, it will *not* explain my brother's psychochrome for February being yellow, and March for him being steel-grey, nor can I see how it is of any service in explaining, *e.g.*, why the vowel *u* is to me silver-grey, why *f* is yellow and *i* black, why 9 P.M. is yellow, or Wednesday brown. Some early picture-book may have been the cause at work; and possibly some such very early pictorial origin may be found to underlie this curious faculty in more cases than is suspected: many persons shrink, however, from confessing to what they regard as nothing more than childish survivals. The majority of persons questioned by Galton on the subject of the origin or cause of their psychochromes replied, "I cannot account for their origin in any way."

PART IV. PSYCHOCHROMÆSTHESIA DUE TO FUNCTIONAL INERTIA. —Lastly, I offer some remarks of a speculative kind. In my own and my brother's case I believe the *tendency* to form psychochromes is innate, *i.e.* was not caused by educational or environmental influences,—is, in fact, "nature not nurture," to use Galton's phrase. Galton has found the tendency to form psychochromes hereditary: in my nephew's case this point also is brought out.

The fact that subsequent environmental influences have had little or no modifying power over the associations, is of particular interest to me in connection with my theory of protoplasmic functional inertia ([12]) as a property in virtue of which the living matter disregards or is inaccessible to environmental stimuli. On this view, the tendency to form these invariable and apparently inevitable associations is the outcome of some internal pre-adjusted molecular configuration or disposition in the protoplasm (functional inertia); not the molecular response to any environmental stimuli (that would be "affectability"), but the expression in consciousness of a pre-existent or innate molecular assemblage now functionally explicit in the central nervous system. The fact that psychochromæsthesia is highly hereditary, corroborates my view that it is due to functional inertia, for I believe that faculties or properties that are inertial are hereditary as opposed to those acquired during the life of the individual which are the response to training, education, or, in other words, the environment, and are now almost universally believed not to be transmitted.

While following out Peillaube's explanation, I have shown that the precise colouring of a concept is in many cases probably due to a very early and now forgotten (subconscious) but revivable link between two concepts; at the same time I do not think that this carries us any distance towards explaining the existence of the inevitable *tendency* to associate colours most arbitrarily with the same concepts throughout life. It is this very tendency, I hold, that cannot be "explained" in terms of anything involving environmental influence or affectability of the living matter. In other words, this tendency flows not from the reaction between environmental (educational) stimuli and protoplasmic affectability, but from certain wholly unknown but innate

TABLE I.

Concepts.	D. F. H.	A. F. H.	Miss Mildred Holden at 13 years of age.
	Colours associated.		
Days of the Week.			
Monday . .	Yellow (deep).	Steel-grey.	Blue.
Tuesday . .	White.	Black.	Pink.
Wednesday .	*Brown.*	*Brown.*	*Brown* or grey.
Thursday . .	White.	Black.	Brown or grey.
Friday . .	Brown.	Yellow.	Pure white, later cream.
Saturday . .	White-grey.	Steel-grey.	Pure white.
Sunday . .	*Yellow* (very pale).	*Yellow*-brown.	Black.
Hours of the Day (P.M.).			
1 P.M. . .	Brown.	Steel-grey.	Black.
2 ,, . .	Yellow.	Black.	Cream.
3 ,, . .	White.	Green.	Blue.
4 ,, . .	Black.	Brown.	Brown.
5 ,, . .	Brown.	Black.	White.
6 ,, . .	*White*-grey.	Steel-grey	Pinkish.
7 ,, . .	Red (magenta).	Brown.	Green.
8 ,, . .	*Black.*	*Black.*	Cream.
9 ,, . .	Yellow.	Steel-grey.	Blue.
10 ,, . .	*Black.*	*Black.*	Brown.
11 ,, . .	Green.	Light brown.	...
12 ,, . .	Yellow.	Dark brown.	...
Months.			
January . .	Red-brown.	Reddish-brown.	...
February . .	White.	Yellow.	...
March . .	Brown.	Steel-grey.	...
April . .	White.	Black.	...
May . . .	Yellow.	Grey-white.	...
June . . .	Mahogany-brown.	Bright red-brown.	...
July . . .	Crimson.	Dark red-brown.	...
August . .	White.	Yellow-brown.	...
September .	Pale yellow.	Steel-grey.	...
October . .	*Black.*	*Black.*	...
November . .	Yellow-green.	Yellow-brown.	...
December . .	*Black.*	*Black.*	...

(non-acquired) molecular dispositions in the protoplasm of the central nervous system, in virtue of the functional inertia of which these unalterable and arbitrary associations early unfold themselves to the consciousness of the percipient. One could not, indeed, predict what kind of phenomenon would arise in consciousness or character as the result of this property of inaccessibility to stimuli (functional inertia), for in one man it might induce the artistic temperament, in another the musical, in a third the gift of philosophising, in a fourth psychochromæsthesia, in a fifth mental instability (inebriety or insanity).

Just as the brothers Nüssbaumer did not experience in all their respective synæsthesiæ the same colours along with the same sounds, so neither do my brother and I experience the same colours in all our corresponding psychochromes. But it would be natural to expect that, if we both possess the tendency as the

TABLE II.

Concepts.	D. F. H.	Miss Mildred Holden, æt. 13.	Four Subjects reported on by Monsieur Peillaube.				A. F. H.
	Colours associated.						
Vowels.							
a	Grey-*white.*	*White.*	Black.	Red.	Red.	Black.	None.
e	Pale brown.	Red.	Grey.	Grey-blue.	Yellow.	White.	,,
i	*Black.*	*Black.*	Red-violet.	Yellow.	White.	Red.	,,
o	White.	Yellow, later cream.	Yellow.	Iron-grey.	Black.	Blue.	,,
u	Grey-white.	Yellow, later cream.	Black.	Brown.	Blue.	Green.	,,
Other Letters.							
b	Black.	Blue.	...	...	...	...	,,
c	White.	Cream.	...	...	...	...	,,
d	Brown.	Blue.	...	...	...	...	,,
f	Yellow.	Brown.	...	...	...	...	,,
g	Yellow.	Green.	...	...	...	...	,,
h	*White.*	*White.*	...	...	...	...	,,
j	Lake.	Brown.	...	...	...	...	,,
k	Brown, palish.	Grey.	...	...	...	...	,,
l	Dark brown.	Blue.	...	...	...	...	,,
m	Dark brown.	Brown.	...	...	...	...	,,
n	Medium brown.	Brown.	...	...	...	...	,,
p	Indigo-blue.	Green.	...	...	...	...	,,
q	Grey.	Purple.	...	...	...	...	,,
r	Black.	Brown.	...	...	...	...	,,
s	Lemon-yellow.	Yellow.	...	...	...	...	,,
t	Steel-blue.	Green.	...	...	...	...	,,
v	Grey.	White.	...	...	...	...	,,
w	Purple-black.	Brown.	...	...	...	...	,,
x	Yellow.	Red.	...	...	...	...	,,
y	Yellow.	Cream.	...	...	...	...	,,
z	Brown.	Green.	...	...	...	...	,,

result of some ancestral molecular disposition common to both of us, there would be more agreement than disagreement in the details of our psychochromes.

On examining the details in the appendix, it is seen that there is shown a total of thirty-one cases in which we both experience psychochromes. We experience the same "colour" (or shades or tints of it) in thirteen cases. In three cases where I experience white, my brother experiences black, namely, Tuesday, Thursday, April. Now, white is the metabolic opposite of black, and therefore we may assume that this common inheritance is expressing itself in one case as an anabolic biotonus, in the other as the complementary or opposite (katabolic) state.

If these three metabolic opposites be regarded as the same and added to the thirteen, we have sixteen cases in which the psychochromes are the same or very similar, a fraction more than 50 per cent.—perhaps sufficient on the statistical side to indicate a community of origin.

REFERENCES.

1. Locke.—"Philosophical Works," London, 1872, vol. ii. p. 26. 2. Lewes.—"Problems of Life and Mind," Third Series, London, 1879; case of the brothers Nüssbaumer, pp. 280–287 (original in *Wien. med. Wchnschr.*, 1873). 3. Galton.—*Nature*, London, 1880, vol. xxi. p. 252. 4. Galton.—*Ibid.*, p. 494. 5. "Zwangmässige Lichtempfindungen durch Schall und verwandte Erscheinungen," von E. Bleuler und K. Lehmann, Leipzig, 1881. 6. Galton.—"Inquiries into Human Faculty and its Development," London, 1883, pp. 145–177. 7. Holden.—*Nature*, London, 1891, vol. xliv. p. 223. 8. Lauret et Duchassoy.—*Bull. Soc. de psychol. physiol.*, Paris, tome iii. p. 11; abstract in *Centralbl. f. Physiol.*, Leipzig und Wien, 1888, S. 135. 9. Albertoni.—*Centralbl. f. Physiol.*, Leipzig u. Wien, 1889, S. 345. 10. Peillaube.—*Rev. phil.*, Paris, 1904, November, p. 675. 11. Peillaube.—Communication to VI. Internat. Cong. Physiol., Brussels, 1904, September. 12. D. F. Harris.—*Brit. Med. Journ.*, London, 1900; *Proc. Roy. Soc. Edin.*, vol. xxiv. part 3; *Proc. Scot. Microscop. Soc.*, vol. iv.

NOTES ON THE INJURIES TO THE TWO HULL FISHERMEN KILLED AND OTHERS INJURED ON BOARD THE STEAM TRAWLER *CRANE* IN THE NORTH SEA ON OCTOBER 22, 1904, BY SHOTS FIRED FROM VESSELS OF THE RUSSIAN FLEET.

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(Plates IX. and X.)

The North Sea disaster is now a matter of history, but, from a medico-legal point of view, it will be interesting to revive particulars of the fatal injuries to the two unfortunate fishermen, and injuries to others of the same crew, received whilst engaged on board the steam trawler *Crane* in the North Sea in the early morning of the 22nd October 1904.

The *Crane*, with a crew of nine hands all told, was on the date mentioned engaged with the "Gamecock" fishing fleet, belonging to Hull, and comprising some fifty vessels, in fishing operations on the Dogger Bank, when the skipper and third hand were killed, and the remainder of the crew, excepting the cook (son of the skipper), received injuries, more or less serious, in consequence of an attack by war vessels of the Russian fleet, commanded by Admiral Rojzhestvensky, who opened fire on the fishing vessels at a range of about a quarter of a mile distant. All the hands on board the *Crane*, excepting the cook and engine-room staff, were engaged in gutting fish.

At the time the vessel was struck the cook was in his sleeping berth, through which a shell passed; but beyond a slight abrasion on his left cheek, caused by splinters, he received no serious injury. It will, however, be seen how narrow had been his escape from more serious injury, if not actual death.

A signal of distress was shown that the *Crane* was sinking, and the trawler *Gull*, of the same fleet, came alongside and took on board the injured men and the bodies of the two men who had been killed, the *Crane* sinking shortly afterwards.

The bodies of the skipper and third hand were subsequently transferred to the *Moulmein*, and conveyed to Hull, the injured men being placed on board the hospital mission ship. The *Moulmein*, conveying the remains of the two men killed, arrived in Hull on Sunday afternoon, the 23rd October, when the bodies were removed to the City Mortuary to await an official inquiry by the Coroner. On admission to the mortuary, the bodies were found to be clad in the fisherman's ordinary outfit.

The post-mortem examination was conducted by Dr. Alfred

Parkin and myself on the 24th October, and the injuries to the two victims may be described as follows :—

1. The Skipper (G. H. S.), æt. 40 years ; height, 5 ft. 8 in. ; weight about 13 stones. Brown hair and moustache.

Appearances.—The body was well nourished. Rigor mortis well developed.

Head.—The whole of the left side of face, portion of right side, the brain and its membranes, and most of the bones of the skull, had been shot away. There was a fracture of the lower jaw on the left side, and of the articular process on the right side. The wound extended over the right eyebrow, across the bridge and down the left side of the nose, and across the left upper lip, laying the mouth open. The continuance of the wound extending behind the ear continued by a jagged edge round the back of the occipital region to the right side, terminating in a line drawn from the eyebrow to the front of the right ear. All the parts inside the skull and above this line were missing, and had no doubt been blown away. The hard palate was broken into small pieces. The base of the skull and the right maxilla had been fractured in various directions.

Chest.—Upon opening the chest and removing the sternum, the heart was found to be fatty, the lungs healthy.

Abdomen.—Stomach empty, perihepatic and perisplenic adhesions ; kidneys healthy ; bladder contained about half a pint of fluid ; general conditions of body and coverings of internal organs, fatty.

Probable point of impact, left side of face ; direction of missile, upwards and backwards towards the right. The posterior flap of scalp was intact, but the right ear was absent. The woollen guernsey which the deceased had worn was not stained with blood, and his clothing was clean and uninjured.

From the statement of an eye-witness, the deceased was holding a knife clenched in his right hand, and a fish in the left. These, however, were absent when the body was admitted to the mortuary, but the appearances of the hands at the time of the post-mortem examination were consistent with the statement.

2. The Third Hand (A. L.), æt. 28 years ; height, 5 ft. 8 in. ; weight about 10 stones. Dark beard and moustache ; brown hair and eyes.

Post-mortem made same day as in the former case.

Appearances.—The body was fairly well nourished. Rigor mortis well developed.

Head.—The whole of the vault of the head had been carried away, apparently by some projectile, which had also carried away the whole of the brain and its membranes, fracturing the bones of the skull. The face below the eyebrows was uninjured. Above that line the skull had been carried away, only a small fringe of periosteum and attached fragments of bone being left on line extending from the eyebrows across the level of tips of ears to the occiput. The anterior fossæ was split centrally and longitudinally backwards. The cerebrum was gone, but the cerebellum remained in a pulped condition. From general

appearances, the projectile had travelled from left to right in an upward direction.

Left arm.—There was a small abrasion on the left shoulder, and a punctured wound, about $\frac{1}{8}$ in. in size, on the upper portion of the left arm, over the front upper third. There was also a small puncture of the brachial artery, in a line and corresponding to the external punctured wound on left arm. Extravasation of some 5 or 6 oz. of blood, extending down the arm and up to the spine along the course of vessels and nerves. A small splinter of nickel metal, irregular in shape and about the size of a split pea, was discovered embedded in the muscles in close vicinity to the ruptured artery.

Chest.—On opening the chest and removing the sternum, bloody mucus was discovered in the trachea.

Heart.—Right ventricle contained clot of blood, but was healthy.

Lungs.—Healthy; no adhesions.

Abdomen.—Stomach contained clot of blood, all the organs were healthy, the bladder containing about half a pint of fluid.

There were no other external marks of violence upon the bodies beyond those described, and the injuries were consistent with having been received within forty-eight hours of the autopsy.

The extent of the injuries, and the carrying away of the entire brain and membranes of each of the deceased men, was evidently due to the velocity plus the rotary motion of the projectiles which had been discharged.

At the Coroner's inquiry, the evidence of the expert witnesses went to show that death was due to gunshot wounds, and that the splinter discovered in the arm of the third hand was portion of a shell corresponding to those manufactured for and used by the Russian Navy.

The finding of the jury was as follows:—

That G. H. S. and A. L. were, at about 12.30 A.M. on the 22nd October 1904, whilst fishing with trawls out in the North Sea, on the Dogger Bank, on board the British steam trawler *Crane*, in company with forty or fifty other vessels of the Hull fishing fleet, on which the Board of Trade marks were exhibited and the regulation lights were burning, killed by shots fired without warning or provocation, from certain Russian warships at a distance of about a quarter of a mile from the said steam trawler *Crane*.

The photographs of the two unfortunate men killed illustrate the extent of their injuries.

1. Photograph of G. H. S. (Skipper), showing injuries to head. Plate IX.

2. Photograph of A. L. (Third Hand), showing—(*a*) Injuries to head. (*b*) The rupture of the left brachial artery caused by the small splinter of shell. (*c*) Posterior view, showing the small portion of shell embedded in the muscles. Plate X.

As previously stated, six other members of the crew of the

Crane received injuries, the skipper's son being the only one to escape serious injury.

The following are brief particulars:—

1. R., Second Engineer.—A deep wound in right side of chest, there being a piece of shell deeply embedded in the pectoral muscle, which was extracted on board the mission ship. This man was in the engine-room at the time he received his injuries.

2. A., Trimmer.—Lacerated deep wound on left forearm, extending through the superficial layer of muscles.

3. S., Mate.—Penetrating wound of back, with a diffused emphysema.

These three patients were transferred to the *Gull*, and subsequently landed at Hull on the 25th October. They were admitted to the Royal Infirmary, and, on further examination with the X-rays, it was discovered that A. (No. 2) had a piece of shell embedded in his injured arm, and in the case of S. (No. 3) a bullet was found embedded in the muscles of the back.

4. N., Chief Engineer.—Two deep incised wounds of the scalp in the sub-occipital region; back peppered over apparently by steel wire; a small piece of steel was found embedded near the right ear, and there was also a wound on the right arm.

5. R., Deck Hand.—Penetrating wound of right hip, extending to the great trochanter.

6. H., Boatswain.—Right hand completely shot off just above the wrist; right clavicle fractured; two perforating wounds of the right shoulder, with compound comminuted fracture of the humerus; and a perforating wound at left side of neck, in which was embedded a fragment of shell.

In the last-named case, the surgeon of the mission ship *J. & S. Miles*, of the Royal National Mission to Deep Sea Fishermen, performed primary amputation of the forearm, the man being afterwards conveyed to London, where he received further attention in the London Hospital.

The mission ship proceeded to Hull with the other injured men, who were removed to the Royal Infirmary on arrival, on the 28th October, to which institution three of their comrades had been previously admitted.

Damage to Trawlers.—With regard to the damage to the trawlers, expert evidence was adduced that the *Moulmein*, *Mino*, *Gull*, and *Snipe* had been struck in several places by small shells, corresponding with those of the British three-inch quick-firing guns. These vessels had also been struck in one or two places with small-bore rifle or machine gun bullets.

In addition, the *Moulmein* had been struck by a shell corresponding to our sixteen-pounder guns, and a number of fragments of three-pounder shells found on the vessels referred to were, from the marks thereon, identified as being of Russian origin, and the bullets were also recognised as being Russian.

There can be little doubt that the deaths of the Skipper and the Third Hand, and injuries to the crew of the *Crane*, were caused by missiles of a similar character.

In view of the damage sustained by these boats, it seems miraculous that those engaged on board should have escaped injury.

The unfortunate incident ended, after an official inquiry, which was conducted in Paris, in the Russian Government awarding a sum of £65,000 as compensation to the bereaved relatives and the injured, and for damage sustained to the fishing vessels engaged in the fishing fleet.

Note.—The incisions shown on arm in Plate X. were made after the body had been washed, and before the post-mortem examination, with a view to ascertaining the extent of the injury, and whether it was recent. It was only on further dissection that the injury to the brachial artery and the spicula of shell were discovered. The small punctured wound and the blood stains of shirt sleeve were the only indications of any injury to the arm.

REVIEWS OF BRITISH AND FOREIGN LITERATURE.

Wharton and Stillé's Medical Jurisprudence. Vol. II. "Poisons." Fifth Edition. Rochester, New York: The Lawyers' Co-operative Publishing Company.

THE fourth edition of this work appeared twenty years ago, so that it will be readily understood that the editors of the present volume have had no light task in bringing it up to date. The literature connected with toxicology has increased enormously during recent years—new poisons have been discovered, or have come into popular use; new methods of chemical analysis have been elaborated; while, owing to the spread of knowledge and the greater facilities for publication, more numerous and accurate observations have been recorded of the effects produced by various drugs and poisons. Much of the text of former editions has therefore had to be revised or expunged, to give place to the new material which the editors have been able to supply.

Obsolete methods for the detection of poisons have been replaced by newer and more reliable processes; while the physiological actions of various poisons have been brought into conformity with the most recent advances which have been made by investigators in this subject.

The work is divided into seven chapters, of which the first deals with the subject of poisoning in general; that is to say, with the definition of a poison; their classification,—we notice that the editors have adopted a classification based upon the chemical and physical relations,—and with the "general evidence of poisoning" in the sense in which Christison used this phrase.

In dealing with the making of post-mortem examinations, we find that the excellent memorandum, "Suggestions for the Medico-Legal Examination of Dead Bodies," which was drawn up by Christison, Syme, and Douglas Maclagan, has been retained. This memorandum was prepared, at the instance of the Scottish Crown Office, for use in criminal and other investigations, and it deserves to be more widely known and followed than it is by those engaged in medico-legal work.

In this first chapter a considerable amount of space is devoted to the discussion of subjects which are of very little importance in connection with death by poisoning, such as the cooling of the body after death, rigor mortis, and post-mortem lividity. We have always thought that nowadays no real significance was attached to such conditions in the diagnosis of poisoning, unless, of course, the possible confusion of hypostatic congestions with the effects of certain poisons.

The editors do not appear, either, to be quite at home in dealing

with these post-mortem changes, and have relied largely upon extracts from the books of Luff and Vivian Poore for information. This has led them into an extraordinary confusion on pages 72 and 73. In discussing subpleural ecchymoses, they say: "Recent writers on toxicology, among whom is Dr. Luff, have undertaken to explain the cause of subpleural ecchymostic spots as a post-mortem change." They then quote a long paragraph from Luff which has nothing whatever to do with subpleural ecchymoses, but deals simply with ordinary hypostasis in the internal organs. And finally, making "confusion worse confounded," the editors proceed to quote again from Luff a sentence and table making it appear as if Luff regarded it of importance to distinguish internal hypostasis from bruises.

Chapter II. deals with gaseous poisons, though scarcely so fully as we should have expected in such a complete work on toxicology. This remark applies especially to CO poisoning, which has become so very common in late years. We find here no reference to the work of Haldane, nor to the tannin test, which in certain circumstances has proved itself of undoubted value.

Chapter III. is devoted to the inorganic poisons; and this, along with Chapter IV., on organic poisons, are the best in the book.

One or two matters, however, to which we should have expected reference to be made, appear to have been omitted; as, for example, the recent occurrence of chronic arsenical poisoning amongst beer-drinkers in England, and the report of the Royal Commission on the presence of arsenic in food-stuffs; as also the comparatively common use of lead as an abortifacient in this country and in certain parts of Europe.

The remaining four chapters deal with alkaloidal and ptomaine poisoning, and with the examination of blood and seminal stains.

An appendix, with several fully reported cases, well chosen as illustrative of the most frequently used poisons, and an excellent index, complete a volume which must be ranked high amongst the text-books on toxicology.

The Treatment of Venereal Disease and Scabies in the Army: Reports by Advisory Board for Army Medical Services. London: Eyre & Spottiswoode. 1904 and 1905.

The Advisory Board for Army Medical Services is to be congratulated on the publication of these excellent reports. They contain a vast amount of valuable information on the treatment of venereal disease, which, although primarily intended for army surgeons, may be assimilated with profit by civilian members of the profession.

The first report deals with recent publications on venereal diseases; the second, with the views of experts, both military and civilian, on the treatment of these diseases; while the third report, by Major Pollock, R.A.M.C., gives a résumé of the methods employed in the more important hospitals of the Continent.

The prophylaxis of venereal disease is not made the subject of special investigation or separate report, but a great deal of information bearing on the difficult question is put on record, and a number of charts are appended to the first volume, showing the admissions for all

venereal diseases during the last thirty years in the different commands throughout the Empire.

A great deal of space is devoted to a description and discussion of the merits of the newer methods of administering mercury. There is an almost unanimous expression of approval both on the part of army surgeons and civilian specialists, of the method by intramuscular injection. In the British army this procedure is being carried out to the extent of 1500 injections per week. Its merits have been especially demonstrated in the troops of the Egyptian command, in whom the amount of sickness and incapacity for service has been enormously reduced since intramuscular injections have been systematically practised.

The zeal and efficiency shown by our colleagues of the Army Medical Department, as shown in these reports, deserve our hearty recognition, and will contribute in no small degree to raise their professional status and reputation with the general body of the profession.

The Thyroid and Parathyroid Glands. By HUBERT RICHARDSON, M.D. Philadelphia: P. Blakiston's Son & Co.

IN view of the enormous literature which has now gathered round the subject, a comprehensive review of what is known as to the thyroid and parathyroid glands was much needed, and Dr. Richardson has in this volume produced a most useful work of reference. The book is avowedly a compilation, but the author has evidently busied himself with both clinical and experimental work in connection with the thyroid, and although he modestly keeps his own researches in the background, his opinions on doubtful points show evidence of careful study and wide reading. The preliminary chapters on anatomy, physiology, and chemistry are all good; that the contradictory results of experimental extirpation of the thyroid are, partially at least, reconcilable when the relationship of the parathryoids to the thyroid is taken into account, is clearly pointed out. Goitre and the surgery of the thyroid receive adequate notice. Of greatest interest, however, are the chapters on cretinism, myxœdema, infantilism, and exophthalmic goitre. We cannot agree that in the majority of cases of sporadic cretinism the disease of the gland is traceable to a post-natal infection, and, while it is quite true that cretinism is seldom recognised in early infancy, this is probably largely due to inadvertence on the part of the observer. With experience it is often possible to make a correct diagnosis very soon after birth, though but few signs are then manifest,—a matter of no little moment, on account of the great importance of prompt treatment. In the section on infantilism a number of conditions unrelated to the thyroid are described; still, we could ill have spared this chapter, which garners an amount of information not, as a rule, too readily accessible. Graves' disease is dealt with in a satisfactory manner. An error, however, relating to the electrical resistance of the skin, has crept into the table on page 204. The book concludes with a useful account of the general therapeutics of the thyroid. There are numerous illustrations, many of considerable merit.

Gerichtärztliche Diagnostik und Technik. By MAX RICHTER. Leipzig: S. Hirzel.

THIS is in many respects a unique book, inasmuch as it covers ground which, so far as we are aware, has never yet been dealt with in such a complete manner in any text book of forensic medicine. The author has for many years enjoyed a wide experience in the performance of medico-legal post-mortem examinations, and in reporting on criminal cases to the judicial authorities in Vienna, and in the present volume he has given us a most valuable commentary upon the technic which is advisable in such cases, and also upon the post-mortem appearances diagnostic of various forms of death resulting from natural and violent causes.

No doubt, much that the author has to say is well known to medical jurists of experience, but the facts have never before been brought together in such a compact, and at the same time clear and instructive manner. To those who have not an extensive knowledge of medico-legal literature, the book will be found to contain a great deal of most valuable practical information, and we believe much also that is new to English readers.

Amongst the most interesting chapters in the volume are those which deal with sudden death from natural causes amongst adults and in childhood. They throw an important light on many points of difficulty in connection with such cases, and are a valuable contribution to the subject which has been so ably treated by Brouardel in his well-known work.

We strongly recommend Dr. Richter's volume not only to all who are interested in medical jurisprudence, but also to pathologists, who will find much in it which will well repay a careful perusal, and which is not contained in general text-books of pathology.

Nothnagel's Encyclopædia of Practical Medicine. English Edition. "Malaria, Influenza, Dengue." London and Philadelphia: W. B. Saunders & Co.

Malaria.—The section on this subject, which comprises the greater part of the volume, is edited by J. W. W. Stephens, who in the preface states that his duties have been light in one respect, as he has left Professor Mannaberg's treatise on the history, symptoms, and treatment of malaria almost unchanged, but arduous in another respect, as, in order to bring the book up to date, he has had to write an account of the relation of mosquitoes to malaria.

The editor hardly does himself justice, for Mannaberg's treatise bears evidence of having been written about seven years ago, before the connection between mosquitoes and malaria was worked out, and it is chiefly the matter contributed by Stephens which renders the work of value. When it is seen that this amounts to about one-fourth of the whole, it is easy to estimate the amount of correction and support required by the original article.

The etiology, symptomatology, and pathology of the disease as known at the time the treatise was written are very fully set forth, and the

compilation of such an immense number of figures must have entailed a corresponding amount of labour. The various data regarding the etiology and incidence of the disease are valuable for reference, but it is hardly necessary to point out that, during the time which has elapsed since the writing of the article by Mannaberg, many important additions have been made to our knowledge not only of the etiology but the pathology of malaria, and not even the exertions of the editor have sufficed to bring the work up to date. As an example of this, the sole reference to the part played by the Leishman-Donovan bodies in the production of tropical splenomegaly, which has completely revolutionised our ideas of this affection, is a short note by the editor on page 359, in which he states that the discovery of these parasites "necessitates a complete revision of the nomenclature and pathology of these cases."

It is generally admitted that for the accurate study of the malarial parasite it is necessary to use stained films, but most of the illustrations given are those of fresh blood. Illustrations of the pathological changes produced in the various organs, as the spleen, liver, and intestine, are conspicuous by their absence. In the chapter on prophylaxis, the measures suggested being based on the miasmatic theory, called for extensive additions by the editor, but apparently he had but little space at his disposal, and has had to content himself with a few brief remarks.

The various methods of treatment are well described, and it is interesting to note, since hypodermic injection of quinine is so much in vogue, that attention is drawn to the risk, not generally recognised, of tetanus following this mode of administration in tropical countries.

The bibliography is extensive, but unfortunately no references are given to any literature on the subject after 1898.

Influenza and dengue.—These subjects are treated by Leichtenstern under the editorship of Grünbaum.

The article on influenza is practically a reprint of Leichtenstern's book published seven years ago, and gives a full description of what was known of the disease at that period.

A very few pages are devoted to the consideration of dengue, and the value of the contribution may be deduced from the fact that the editor, in a footnote, finds it necessary to point out that the article was written "before the publication of Ross's researches on malaria and the discoveries which have arisen therefrom," and reference is made to the "latest" epidemic in 1889.

The work, which has been written in Germany, translated in America, edited in England, and printed in America, cannot, for many reasons, be accepted as an authoritative exposition of what is at present known of either malaria, influenza, or dengue, and the adoption of the American mode of spelling such words as "center," "meager," and "decads" will hardly be a point in its favour with readers in this country.

RECENT ADVANCES IN MEDICAL SCIENCE.

MEDICINE.

UNDER THE CHARGE OF

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The Action of X-rays on the Tissues, especially in Leukæmia.

It is now two and a half years since Senn reported the first case of leucocythæmia treated by X-rays. He was led to try these on account of their remarkable action on sarcomatous and other tumours, lymphadenoma, and the like, and the results in leukæmia were no less surprising. In fact, his case, as it was the earliest, seems also to have been one of the most successful on record. Since the beginning of 1904, treatment by X-rays has been extensively employed in leukæmia, and certainly more than a hundred reports have now been published; besides this, the remarkable effects of the rays in the disease have led to renewed investigation of their action on animals; and though a great many points still remain obscure, it is now possible to state in a general way what may be expected from the treatment, what its risks are, and, though with less certainty, its *modus operandi*. Probably the greatest benefit which Senn's observation has led up to has been the directing of attention to the last point; for a long time investigators had dealt chiefly with the more obvious phenomena of dermatitis, disregarding the hidden, though probably by no means less important, changes induced in deeper organs.

First, then, it may be stated that there is no question of the cure of leucocythæmia by X-rays; all that can be claimed is that in many cases they temporarily produce very great symptomatic improvement. The best results have been obtained in chronic myelocytic leukæmia; most observers are agreed that lymphocytic cases are less amenable, though Capps and Smith state that the response in chronic lymphatic leukæmia is even more prompt than in the myelogenous type. Opinions are unanimous that acute cases receive no benefit; but when the disease has run a chronic course, the fact that the patient is apparently *in extremis*, suffering from toxæmia and perhaps hæmorrhages, need not act as a deterrent to the use of the X-rays, as several cases (Schieffer) have speedily recovered for the time being under such circumstances.

Effects of X-rays on the hæmopoietic organs.—The results of exposure are generally very prompt and striking. After one or two sittings the spleen becomes softer and more movable, and diminishes in size;

ascitic fluid, if present, is absorbed, and glandular swellings and hepatic enlargement disappear. Though, as a rule, the spleen does not absolutely regain normal dimensions, it is reduced to such an extent as materially to enhance the comfort of the patient. Sometimes, although the blood improves, the size of the spleen is but slightly influenced, while occasionally even very prolonged exposures (570 minutes in Krause's case, thirty sittings in Hoffmann's) have been followed by no reduction of the organ. When tenderness of the bones exist, it is relieved by the rays.

Effects of X-rays on the blood.—The immediate effect of the rays is to produce a temporary rise of the leucocytes, which is apparently due to the profound changes produced in the lymphoid tissues causing the circulation to be flooded with white cells. This has been noticed by several observers, and is well shown in Musser's case, where such figures as 490,000 and 660,000, and 295,000 and 450,000, before and directly after the exposure were got. These rises are of very short duration, and are usually succeeded in a few hours' time by a marked fall; whether they are due to an increase in all the cells, or, as might be conjectured, to a lymphocytosis, is a point which apparently has not yet received attention. Apart from this transient rise, the general effect of the treatment in a favourable case is a marked and persistent descent in the number of leucocytes. Franke records a fall after a single exposure from 342,000 to 180,000. As one instance out of many, Lommel's case will serve. In ten days, during which daily exposures were given, the leucocytes fell from 554,000 to 158,000; during a twelve days' pause, to 30,000; after twelve further exposures, to 12,000; after another thirty-one days' pause, to 10,000. A good deal has been written as to the qualitative changes in the blood after raying, in particular as to whether it ever assumes an entirely normal appearance. Practically we may say that in some cases it to all intents and purposes does so, myelocytes disappearing for a time at least, but as a rule a few abnormal cells can still be found, even though the actual leucocyte count is normal or subnormal. Arneth has worked out the changes in the various leucocytes with considerable fulness. He finds that the percentage of neutrophile polynuclears increases steadily, and that even after relapse these cells remain abundant; at the same time neutrophile myelocytes diminish, but the neutrophile cell group, as a whole, never becomes quite normal. The eosinophile cells, on the contrary, become normal in character and number; the percentage of mast cells rises at first, then falls; the lymphocytes, especially the larger forms, diminish steadily. Some figures from Arneth's paper illustrate these points:—Total count, 187,200—neutrophile, 53; eosinophiles, 10·5; lymphocytes, 12; mast cells, 23; total count one month later, 13,200—neutrophile, 78; eosinophiles, 6; lymphocytes, 5; mast cells, 11. Franke's observations confirm and extend those of Arneth. The greatest diminution takes place in the neutrophile myelocytes, mast cells sink more slowly, while the lymphocytes diminish in proportion to the total fall. Arneth has made extensive observations on the behaviour of the polynuclear leucocytes under various conditions, grouping them according to the shape of their nuclei. In health, 45 per cent. belong to groups which he designates 1 and 2 (simple nuclei), 55 per cent. to groups 3, 4, and 5 (convoluted nuclei). In disease, the pro-

portion alters in favour of the first group. Applying this to leukæmia, Franke finds, as might be expected, that the first group contains about 90 per cent., and that while this figure falls under the X-rays the normal 45–55 ratio is never attained. No such detailed observations seem to have been made in cases of lymphocytic leukæmia; apparently, however, even although the total leucocyte count falls to normal or nearly so, a very high percentage of lymphocytes remains. If one were to make a general statement about the behaviour of the leucocytes under X-rays, it would be that while all diminish in number, those which are pathological are especially affected. Not less striking than the changes in the white cells is the effect on the erythrocytes; these often rise to an almost normal figure, at the same time nucleated red cells and poikilocytes, etc., disappear, and the blood assumes a practically healthy appearance. Concomitantly with the ascent in the number of the red cells, the hæmoglobin rises, though rather slowly. In fact, if the treatment is being successful, the case passes into the so-called "aleukæmic stage."

General effects of the rays.—In most cases, even where the benefits of the X-rays on the blood and hæmopoietic organs are not very great, there is marked general improvement, shown subjectively by the patient's feelings, and objectively by gain in weight—in a word, he again becomes fit for work, and this has been the reason why so many cases have been lost sight of, and why the treatment has been suspended. Bad effects have been comparatively few. Dermatitis, slight or severe, is perhaps the most frequently mentioned; sometimes it has seriously interrupted the sittings, occasionally it has been accompanied by fever. Nephritis has been recorded (Franke), some patients have complained of palpitation, giddiness, and pain over the spleen; vomiting, diarrhœa, and loss of hair have also been caused. One or two patients have died suddenly during or after treatment, even though there had apparently been a marked improvement; bearing in mind, however, that such an occurrence is not rare in leukæmia, it is doubtful how far it should be ascribed to the action of the rays. Türck, at the Wiesbaden Congress, warned his hearers as to the need for care, lest acute symptoms should suddenly develop; and the impression one gets from reading over a number of cases is that, after apparent cure, sudden relapse is common, is seldom so amenable to treatment as the original condition was, and is, if acute, very speedily fatal. The action of X-rays on metabolism will be referred to subsequently.

Technique.—Although opinions vary, the majority favour hard tubes as being more penetrating and less likely to cause dermatitis. Short sittings of from three to ten minutes thrice a week or oftener are better than more prolonged ones at greater intervals. All agree that exposures should be made over the spleen; in many cases the long bones have also been rayed. In one of Arneth's cases, under treatment for relapse, it was found that exposure of the bones alone reduced the size of the spleen; but this appears a solitary experience. Raying the liver is useless. If the glands are large, they should be exposed to the rays, adjacent structures being protected by lead shields.

Duration of relief.—Striking though these results are, their temporary nature is all too evident, and in no case has the suggestion been made that a cure was effected. It is difficult to say how long improve-

ment may be expected to last, as the final upshot of most cases is not reported. Still, we know of some in which the patient was comparatively well and able for work after six months had elapsed, though in most instances recurrence takes place much sooner. For various reasons, chiefly, it would seem, because patients have declined treatment, no systematic records exist of attempts to prolong the aleukæmic stage by periodical use of X-rays, and it seems that along this line work still remains to be done.

Effect of X-rays on the animal economy.—The most important work has been done by Heineke, employing rabbits, mice, guinea-pigs, and dogs. In all these animals he obtained proof of marked selective action on the lymphoid tissues. Small animals died after prolonged exposure to the rays, and the following changes were found post-mortem:—*Spleen.*—Destruction of the lymphocytes of the pulp and follicles; increase of pigment. *Glands and intestinal canal.*—Destruction of the lymphocytes in the follicles. *Bones.*—Rarefaction of the specific marrow cells. The other organs were healthy. Disintegration of the lymphoid tissue in the follicles of the spleen, intestine, and glands begins within three hours of exposure, reaches a maximum in six to eight hours, and is complete within twenty-four to thirty-six hours. The splenic pulp and marrow are affected later—after two to three days. Pigmentation of the spleen appears after about a week. The effect on the lymphoid tissue is temporary, and regeneration speedily takes place. Milchner and Mosse exposed one hind leg of a rabbit to the rays, the other being protected by a lead plate. They found that the marrow cells were much affected, losing their granulations, and becoming fewer in number. It also appeared that the hæmoglobin-bearing cells of the marrow were entirely unchanged; and further observations on the behaviour of erythrocytes *in vitro* showed that these cells displayed a very high degree of resistance to X-rays. There is also some evidence that X-rays exert a destructive action on the leucocytes in the general circulation; this is suggested by the fact that in man their histological appearances are altered during treatment; it is also said to have been demonstrated in animals. On the other hand, the serum of cases which have benefited has no leucotoxic power (Franke). Heineke's work, which has been almost universally accepted, supplies a fairly good explanation of the action of X-rays in leukæmia. The rapid disintegration of the lymphoid tissue throughout the body leads to diminution of the leucocytes, while the rise of the red corpuscles (which resist the action of the rays) is explained by the marrow, now freed from its infiltration of new cells, again becoming capable of its proper hæmopoietic function. This, the most usually received theory, is a rough and ready one, and it is difficult to see why lymphatic leukæmia should benefit less than the myelogenous type. Arneth, however, holds that improvement is due to the rays antagonising the unknown (parasitic?) cause of the disease, one of his objections to the cell-destruction theory being Rosenberger's statement that during the period of diminishing leucocytosis the uric acid output falls. If this were so it would point against the leucolytic hypothesis, but the recent work of Gramegna on animals, and of Musser and Edsall on man, clearly prove that extensive tissue destruction necessarily accompanies favourable progress, while, when no benefit accrues, there is retention of

nitrogen and phosphorus. In Musser's favourable case, the average daily loss of nitrogen was 5½ grms. Possibly this sudden tissue destruction may be a source of danger if the kidneys be unsound. Musser and Edsall regard the action of X-rays as indirect, and depending on the ability of the individual patient to react to a stimulus which brings about autolysis of leukæmic tissue. It must suffice merely to mention that good results have also been obtained in Hodgkin's disease, and some cases of pernicious anæmia and Banti's disease, but not in polycythæmia with enlarged spleen.

REFERENCES TO PRINCIPAL RECENT PAPERS.

CAPPS.—*Journ. Am. Med. Ass.*, Chicago, 1904, September 9. SCHIEFFER.—*München. med. Wchnschr.*, 1905, January 24. LOMMEL.—*Ibid.*, 1905, May 9. ARNETH.—*Ibid.*, 1905, August 8, 15, and 22. HEINEKE.—*Ibid.*, 1904, No. 18. MILCHNER AND MOSSE.—*Berl. klin. Wchnschr.*, 1904, December 5. FRANKE.—*Wien. klin. Wchnschr.*, 1905, August 17. MUSSER AND EDSALL.—*Univ. Penn. Med. Bull.*, Phila., 1905, September. MÜLLER.—*Cor.-Bl. f. schweiz. Aerzte*, Basel, 1905, October 1. DOCK.—*Am. Med.*, Phila., 1904, December 12. ROSENBERGER.—*Centralbl. f. innere Med.*, Leipzig, 1905, October 7. SCHIRMER.—*Centralbl. f. d. Grenzgeb. d. Med. u. Chir.*, Jena, 1905, Nos. 1, 2, and 3.

SURGERY.

UNDER THE CHARGE OF

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THE TREATMENT OF PROSTATIC HYPERTROPHY.

THE discussion on this subject which took place at the first Congress of the International Society of Surgery, held at Brussels in September 1905 (*Rev. de chir.*, Paris, 1905, October) shows that the authorities are not yet fully agreed as to the indications for operative interference, or on the method of choice in the cases selected for operation. On the whole, the trend of opinion at present seems to be in favour of complete ablation of the enlarged gland by the supra-pubic route.

The *removal of the testes*, so strongly advocated by White some years ago, has few supporters now. Reginald Harrison, of London, is not inclined entirely to reject this operation in early cases of hypertrophy. He claims that it has sometimes arrested the progress of the disease, but admits that it is incapable of causing an enlarged gland to retrogress. Kummell, of Hamburg, in spite of the fact that in all the cases in which he has performed the operation he has had good results, has abandoned it, as it is one which has a profound effect on the patient. The majority of those who took part in the discussion made no reference to this operation.

Vasectomy finds its strongest supporter in Rovsing, of Copenhagen. He feels that this operation does not merit the discredit which has fallen upon it. He still practises it in all cases of soft, diffuse parenchymatous hypertrophy. It is contra-indicated, however, when the gland is hard and fibrous, and when there is a middle lobe producing retention. In 60 per cent. of his vasectomies, Rovsing has obtained a cure, and he has only had 10 per cent. of failures. There is no operation mortality, and the procedure can be carried out under local anæsthesia. Albarran, of Paris, on the other hand, has been so dissatisfied with the operation that he has abandoned it. Reginald Harrison assesses it at the same value as castration.

Bottini's galvano-caustic operation, which has never received much favour in this country, appears still to have influential support on the Continent. Freudenberg, of Berlin, who shares with Bottini the credit attached to this procedure, entered a strong plea for it. He has performed the operation in 152 cases, obtaining good results in about 85 per cent., no benefit in about 8 per cent., while in about 7 per cent. the operation was fatal. The results in his last fifty cases were appreciably better—90 per cent. good; 6 per cent. negative; 4 per cent. fatal. Freudenberg considers the operation more suited to the urinary specialist than to the general surgeon. As the operation is less severe than prostatectomy, and does not necessitate the patient being long confined to bed, it is preferable in very old and debilitated patients. In relatively young men also it is indicated, as it does not interfere with the sexual function, and the *potentia generandi* is not modified. Bottini's operation is suitable in cases where the gland is small or but moderately enlarged. In cases also where the obstruction takes the form of a prostatic bar, this operation yields results which are almost absolutely sure. Cases with projection of the middle lobe are not good for Bottini's operation; nor is the operation to be selected when the nature of the obstruction cannot definitely be ascertained by cystoscopic and other means. The presence of a calculus does not exclude the operation, as the stone may be removed by lithotrity. In the presence of an alkaline cystitis the operation should be deferred until the urine is again acid.

Giordano, of Venice, also favours Bottini's operation, as he finds that in the immense majority of cases it suffices to re-establish the voluntary evacuation of the bladder. Although it does not cure all prostatics, it ameliorates their condition. Kümmell, too, speaks well of the operation. He has had forty cures and two deaths. He is not, however, quite satisfied with the ultimate results.

Jaffé, of Posen, believes that the difficulty of micturition lies, not in the mass of prostatic tissue, but in the level of the exit from the bladder, and the painful contraction of the sphincter which opposes the outflow of the urine. As it is against this rather than against the hypertrophied gland tissue that our efforts should be directed, he considers that Bottini's operation is the ideal means of relieving the painful tenesmus of prostatics. In the majority of his cases it has given excellent results.

Hartmann, of Paris, although he has practised this operation, is not enthusiastic about it; and Albarran considers it a more serious pro-

cedure than prostatectomy, and much less certain in its results. In the experience of Frank, of Berlin, the results have not been permanent, and he has seen a number of patients some years after the operation suffering again from all the symptoms of prostatism. On cystoscopic examination of these patients, the scar of the original operation could be recognised, but the prostatic tissue had continued to increase and had undone the good effected by the galvano-cautery.

Prostatectomy.—The majority of those who took part in the discussion consider that prostatectomy is the best means of relieving patients suffering from the effects of enlargement of the gland. Some, however, take a more conservative attitude. Rovsing, for example, thinks that too much has been made of prostatectomy, and he is inclined to persevere with catheterism longer than most. He points out that the mere enlargement of the gland is in itself an innocent condition, and that it is only the secondary effects which call for surgical intervention. His estimate of the value of vasectomy has been cited above. In this connection he remarks in passing, that it is curious to find the convinced opponents of castration and vasectomy become advocates of total prostatectomy, which admittedly sacrifices the sexual power as completely as these other operations. Hartmann also, while admitting the value of prostatectomy, remains faithful to the older methods of treatment by instruments and lavage, as is proved by the fact that out of 658 prostatics seen at his clinic since March 1901, he has only operated on fifty-six, or one out of every twelve. Albarran, on the other hand, considers prostatectomy indicated when there is chronic retention and the catheter is constantly required, and especially if there is any cystitis, calculi, or slight pyelo-nephritis. He adds that it is impossible to define the indications in general terms, as each case must be considered on its own merits.

As regards the choice of route, the speakers were not inclined to be dogmatic. Each route had its advocates, but it was generally admitted that both had advantages in certain cases. Albarran is perhaps the most whole-hearted supporter of the *perineal* operation, which he has performed seventy-three times with three deaths (one from chloroform). He does not admit the validity of the objections which have been raised against this procedure. Rectal fistula can be avoided with ordinary care; and incontinence of urine, which Reginald Harrison has found to ensue, has not occurred in his experience. There is no greater risk of loss of sexual power from the perineal than from the supra-pubic operation. Rydygier considers that when there is not a median lobe the surgeon should be content with resection of the lateral lobes by the perineal route without opening the urethra. Verhoogen prefers the perineal route when the prostate forms a salient swelling towards the rectum and when it is compressing the urethra. He operates with the patient in the ventral position, as in this way the perineum is opened out and the prostate is more easily reached and manipulated. Giordano also expresses preference for the perineal route on account of the dependent drainage.

Among those who favour the *supra-pubic route* in general terms are Reginald Harrison, Legueu, Jaffé, and Frank. Hartmann has given up the perineal operation in favour of the supra-pubic, which he con-

siders infinitely more rapid. Kümmell thinks the result is more sure and the cure more rapid by the supra-pubic operation. Freudenberg, Verhoogen, and Albarran prefer the supra-pubic route for the removal of voluminous prostates which project towards the bladder. Carlier considers the supra-pubic route indicated in elongated prostates with intravesical projections; in hard, fibro-adenomatous prostates; in prostates with a well-marked median lobe, especially when it is salient in the bladder; when calculi are present; in stout patients with a deep perineum; and in those cases in which the prostate is felt with difficulty from the perineum.

Rovsing advises *partial* prostatectomy by the supra-pubic route in all cases where retention is due to a median lobe, and when there is not marked vesical infection. *Total* prostatectomy is only indicated, he thinks, when there is reason to fear sarcomatous or carcinomatous degeneration of the hypertrophied gland, or when there are repeated hæmorrhages or abscess.

Delagénière has successfully employed the combined perineal and supra-pubic operation.

OBSTETRICS AND GYNÆCOLOGY.

UNDER THE CHARGE OF

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Rupture of a Cæsarean Section Scar.

Henkel (*Ztschr. f. Geburtsh. u. Gynäk.*, Stuttgart, Bd. liv. Heft 2) reports the case of a woman who had two previous Cæsarean sections performed. She was seized with sudden severe abdominal pain when nine months pregnant. The abdomen was opened, and fœtus and placenta were removed from the peritoneal cavity. A rupture through the old uterine scar was found. The wound was pared and the edges brought together by deep interrupted and superficial continuous sutures. This was the first case of rupture of the uterus occurring in a series of 120 Cæsarean sections performed in Olshausen's klinik.

Intestinal Obstruction after Supravaginal Hysterectomy.

Tate (*Journ. Obst. and Gynæc.*, London, 1905, January) reports three cases of intestinal obstruction following operations for fibroid tumours of the uterus, the symptoms of obstruction occurring during early convalescence. Tate supposes that the nature of the operation is responsible for the complication, and would substitute panhysterectomy for the supravaginal operation. Corner (*Practitioner*, London, 1905, August)

supports Tate's observations, and reports similar cases after pelvic operations. To prevent this complication, he recommends that the supravaginal operation should be completed by a long posterior flap, containing muscular tissue. The long anterior flap recommended by Jacobson is more easily cut, but less accurately sutured, than a posterior one.

Changes in the normally placed Placenta in Cases of its Premature Separation.

Blancardi (*Ann. di ostet.*, Firenze, 1905, May) gives the results of the microscopic examination of a number of cases. The lesions found are due to a continuance during pregnancy of a previously existing endometritis, and the abnormal placental conditions are caused primarily by fatty degeneration. This was accompanied by inflammatory conditions, secondary extravasations of blood, and alterations of the villi, with changes in the fœtal structures as well. Blancardi believes that endometritis resulting in such changes is by far the most common cause of early detachment of the placenta.

Chronic Oöphoritis.

Theilhaber (*München. med. Wchnschr.*, 1905, June) believes that primary chronic oöphoritis is rare, the condition being usually secondary to metritis or tubal disease. Enlargement of the ovary is of little diagnostic value, as normal ovaries are often enlarged, especially during menstruation. The changes in the ovaries are too variable to be of great diagnostic value. Localised pain and tenderness on pressure occur in other conditions, and the size of the ovary varies. Generally the ovarian condition is secondary to inflammatory tubal lesions.

Vaginal Cysts.

Cullen (*Johns Hopkins Hosp. Bull.*, Baltimore, 1905, June) from an examination of fifty-three specimens classifies them etiologically as follows:—(1) In twenty-six the origin was clearly the result of a perineal tear or perineal operation. (2) Four seemed to originate from vaginal glands. (3) Eleven were derived from Gärtner's duct. (4) Three were situated close to the external orifice of the urethra. (5) In eight it was impossible to determine the origin. The inclusion cysts are due to small portions of the vaginal mucosa being included in the stroma. Such are small, and occur most frequently on the posterior wall. The most common position for cysts originating from Gärtner's duct was in the anterior vaginal wall behind the urethra. In two cases the cysts probably originated in urethral glands. Cullen considers that "gas cysts," found in the vagina during pregnancy, are analogous to those found in the liver, and due to a gas-producing organism. Echinococcus is a rare cause of vaginal cyst.

Paravaginal or Abdominal Operation in Carcinoma of the Uterus.

Gellhorn (*St. Louis Med. Rev.*, 1905, June) comes to the following conclusions:—(1) The radical abdominal operation as far as the routine ablation of the pelvic glands is concerned, has so far failed to yield the desired results. (2) The removal of the parametria increases the percentage of cures. (3) Abdominal and vaginal operations which do not include this procedure must be discarded. (4) For the extirpation of the parametria, Wertheim's method is the best of abdominal operations. (5) It has certain advantages over Schuchardt's paravaginal operation.

Indications and Technique of Cæsarean Section.

Dauber (*Ztschr. f. Geburtsh. u. Gynäk.*, Stuttgart, Bd. liv.) reports on thirty cases performed in Hofmeier's clinic in fifteen years—one case in 251 labours. Of the thirty cases, sixteen were conservative, fourteen Porro's operation. Of the latter six were typical, and eight sub-peritoneal. The indication for operation was contracted pelvis in twenty-six —86 per cent. Of the twenty-six, rickets was the etiological factor in fifteen, osteomalacia ten, Naegele pelvis one, myoma was the indication in three cases, eclampsia in one. Dauber would replace the induction of premature labour by section. The uterus should be removed—(1) When the uterus is infected; (2) if myomata are likely to require removal at some subsequent period; (3) osteomalacia; (4) atonic bleeding. Dauber does not favour Fritsch's fundal incision, and the operation may be performed before the onset of labour.

On Closing the Peritoneum after Vaginal Hysterectomy.

Schultze (*Monatschr. f. Geburtsh. u. Gynäk.*, Berlin, Bd. xxi.) closed the peritoneum in fifty-six cases of total extirpation of the uterus for carcinoma and myoma. There were four deaths, in no way, however, due to the operation. He considers the danger of drainage to be greater from such causes as prolapse of the omentum or intestine, with resulting intestinal obstruction, fistulæ, and ulceration of bladder or bowel.

THERAPEUTICS.

UNDER THE CHARGE OF

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Alypin: A New Local Anæsthetic.

Alypin, the primary hydrochloric acid salt of benzoyl-tetramethyl-diamino-ethyl-dimethyl-carbinol, is a crystalline non-hygroscopic body

which melts at 169° C., and is readily soluble in water. The solution is neutral in reaction, and the further addition of moderate quantities of bicarbonate of sodium does not cause precipitation. A distinct advantage of the new body over cocaine is that it can be boiled for five to ten minutes without undergoing chemical alteration or losing in anæsthetic power. In 2–4 per cent. solution alypin keeps well, but weaker solutions are apt to go mouldy. Impens (*Deutsche med. Wchnschr.*, Leipzig, 1905, No. 29) has described the action of the new substance. He finds that it is readily absorbed from mucous membranes, and exerts a powerful anæsthetic action, which is as strong as that of cocaine. On the human eye, alypin in 2 per cent. solution causes a temporary burning sensation, which passes off within sixty to seventy seconds, leaving the cornea insensitive. A few seconds later sensation disappears from the deeper structures. Hyperæmia of the conjunctiva results from the vaso-dilating action of the drug, but this passes off along with the anæsthesia in eight to ten minutes, whereupon the eye resumes its normal appearance. The drug produced no mydriasis or disturbance of accommodation. Alypin is much less toxic than cocaine. Very large amounts produce symptoms closely corresponding to those of cocaine intoxication, consisting of psycho-motor stimulation leading to violent clonic convulsions. Toxic doses cause death from exhaustion. Neither the heart nor respiration are seriously affected, since the lethal dose is easily borne if the convulsions be suppressed by suitable doses of isopral. For dogs and cats the lethal dose of alypin is roughly about double that of cocaine. In the small quantities required to produce local anæsthesia no action on the circulation or respiration is produced. Alypin is less expensive than cocaine.

These claims have been confirmed in various clinical reports. Seifert (*Deutsche med. Wchnschr.*, Leipzig, 1905, No. 34) has used alypin in naso-laryngeal work. A 10 per cent. solution proved suitable for rendering painless simple cauterisation of the nasal mucous membrane either with chromic acid or the galvano-cautery. It exerts no vaso-constricting action, which is perhaps a disadvantage, as the field of operation is not so readily viewed. The same strength of solution is suitable for general operative work in the interior of the nose, while the injection of 2–3 c.c. of a 10 per cent. solution proved useful for alleviating the pain of tuberculous ulceration of the larynx.

Seeligsohn (*Deutsche med. Wchnschr.*, Leipzig, 1905, No. 35) finds alypin an excellent anæsthetic for ophthalmic work. It is as efficient an anæsthetic as cocaine, while it causes neither mydriasis nor disturbance of accommodation. The intra-ocular tension is not raised, and there is no subsequent scaling of the cornea.

Sicherer (*Opth. klin.*, 1905, No. 16) comes to the same conclusion, but Neustätter (*München. med. Wchnschr.*, 1905, No. 42), while satisfied with the general action, states that in his experience alypin causes more smarting than cocaine, while the anæsthesia induced is not quite so deep.

Stotzer (*Deutsche med. Wchnschr.*, Leipzig, 1905, No. 36) has used the new drug as a local anæsthetic in general minor surgical operations. He finds that the injection of alypin causes no burning, while uniform good anæsthesia is obtained. He used it extensively for dental operations in 2 per cent. strength. For general surgical purposes he seems to

have used 2–3 per cent. solutions. The absorption of the drug is rapid. In no instance did local inflammation or necrosis follow the injection, while in none of the cases was an action produced on the cerebrum as mental stimulation.

The Anti-rheumatic Action of Maretin.

A short time ago a number of articles were published in which it was stated that maretin, a hydrazin derivative, exerted a specific action in acute rheumatic fever. Kirkovic, writing from Neusser's clinique, has recently published an account of his experiences with this drug. He claims that it exerts a rapid and specific action in acute rheumatic fever. The acute cases he describes are somewhat unsatisfactory. The first was one of mild polyarthritis with very slight fever. Maretin in 7½ grs. twice daily relieved the pain within a few hours, while redness and swelling disappeared within the next forty-eight hours. The patient was dismissed cured at the end of six days. Two other cases seem to have been really purpura with implication of the joints. The only typical case was that of a girl, æt. 27, suffering from her third attack of fever. The result of the maretin treatment was not altogether satisfactory. It was given in large doses up to 7½ grs. five times in the day. Pain was relieved in twenty-four hours, and redness and swelling disappeared in the course of the next day. By the end of the sixth day only slight pain on making forced extension remained. The drug was then reduced to three doses of 7½ grs. daily, but on the eighth day of treatment palpitation with slight dyspnœa came on. Physical examination of the heart revealed nothing abnormal. This state of affairs continued for three days, despite the application of cold to the præcordial area. Maretin was then stopped, and digitalis was given, whereupon the cardiac distress gradually passed off, but lack of appetite and a mild degree of subicteric discoloration of the skin developed. Six days after stopping maretin, slight pain reappeared in the metacarpo-phalangeal joints with some fever, but rapidly disappeared on renewing the use of maretin. In cases of subacute rheumatic fever the drug gave good results (*Wien. klin. Wchnschr.*, 1905, No. 37).

Potassium Permanganate as a Local Styptic.

Vörner recommends potassium permanganate as a reliable local hæmostat suitable for controlling bleeding from small operations, as removal of nævi, warts, condylomata, or cutaneous tumours. He employs the drug in three forms. A concentrated aqueous solution may be used, but is not so suitable as a fine powder made by rubbing up a moistened mixture of two parts permanganate with one part kieselguhr, and subsequently drying the resulting fine powder. The most suitable form for administering the powder is in the shape of a paste made up with one-third its bulk of paraffin ointment. The technique employed consists in compressing the bleeding area with gauze swabs for a short time, and then applying the permanganate firmly against the wound. This process may need to be repeated a few times in severe cases of hæmorrhage. The concentrated solution stains the skin a brownish-

black colour. In sensitive individuals some burning is experienced. The microscopic examination of incised or wounded rabbit's skin treated in this fashion showed that the exposed connective tissue is for some distance turned brown, but the shape of the fibres is still recognisable. The red corpuscles are converted into firm blackened structures. Epithelial cells are similarly affected by the fine powder, but are little acted on by the paste.—*Munchen. med. Wchnschr.*, 1905, No. 38.

Digestive Ferments.

Bettmann discusses the therapeutic value of the digestive ferments. He points out that even in healthy conditions of the stomach the secretion of pepsin varies within wide limits, while of all the gastric secretions it is the most resistant to diseased conditions, and remains longest undisturbed. Only in profound disease of the stomach does pepsin disappear entirely, as in achylia gastrica, some cases of carcinoma, and atrophy of the gastric mucous membrane. An extensive series of observations has given disappointing results from the administration of pepsin. In few chronic cases could benefit be long obtained, and it was only in a few cases that the exhibition of pepsin enabled the patient to utilise larger quantities of proteid food. In many cases pepsin seemed to bring amelioration of symptoms for a brief period, extending as a rule for only a few days, but in some cases for several weeks. Theoretically pepsin is often indicated; practically, it rarely does good, and then only for brief periods. Among the cases in which it did good he mentions dyspepsia of infants, fermentative diarrhœa, and acute indigestion, where it exerts a soothing influence, and enables the patient often to eructate gas. It did no good in achylia gastrica and atrophic gastritis, and it is useless in carcinoma.

In using pepsin a fair quantity should be given, and it is best made up in a strength equivalent to a 0·35 per cent. solution with weak hydrochloric acid. A suitable formula is pure pepsin 3·5 grms.; dilute HCl 10·0 c.c.; water 60 c.c. A teaspoonful of this mixed with 60 c.c. (2 oz.) of water will contain about 0·35 per cent. pepsin in 0·1 per cent. absolute acid, corresponding to a weak gastric juice. The continued administration of an acid pepsin mixture does not impair the secreting power of the stomach.

As regards the indications for the use of diastases, they are but few. As a rule, the faulty conversion of the starches is due to the starch being ingested in too large quantities, or in an unsuitable form, or the mastication may be imperfect and the starch is swallowed too rapidly. Further excisive or too rapid appearance of gastric juice would inhibit the action of ptyalin, but in any of these conditions it is much sounder to check the faulty habit or to restrict the amount of starch than to attempt to correct matters by adding diastases. The number of cases in which the use of pancreatic extracts has proved useful is gradually increasing, and it would seem always rational to administer these extracts when the pancreas is known to be diseased or partially destroyed. In pancreatic diabetes they have proved useless, but in certain cases of fatty stools the use of pancreative preparations has proved highly successful.—*Am. Med.*, Phila., 1905, September 9.

DISEASES OF THE EYE.

UNDER THE CHARGE OF

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Retro-Ocular Neuritis.

A paper of great interest was read some time ago before the British Medical Association, dealing with this subject; it is only now, however, published *in extenso*, and it forms very valuable reading. Mr. Marcus Gunn gives us a wide and philosophic view of the subject. The symptoms by which a diagnosis may be made, even in the absence of any fundus changes, are individually discussed, and on several of them interesting side-lights are cast. When dealing with the diminution of power to distinguish colours, for example, a prominent feature in nearly every case of retro-ocular neuritis, he says: "This loss of colour sensation may be profound in a very severe case, while in the slighter degrees of retro-ocular neuritis there is always a complete or relative scotoma for green and red at or near the fixation point. . . . It will suffice to say that red gives little light, and is perceived as a colour practically as soon as it becomes visible; when it is not perceived, the object is consequently described as black, in contrast with its surroundings; thus in a severe case of neuritis a patient tells us that the fire looks black. On the other hand, in the case of green, there is a marked interval between the intensity necessary for the perception of light and that necessary for the recognition of colour; in a loss of conduction the light often persists though no colour can be perceived, and the green test object under these circumstances will be described as white or grey." Later in his paper, while discussing the manner in which the papillo-macular bundle of fibres is affected, he shows that the degree of affection may vary from a faint loss of accuracy at the macula to an absolute loss of all vision over that area. From some points of view, it seems strange that just this particular bundle should be singled out; the fibres comprising it form a group which at first occupies the outer part of the nerve, but quickly approaches the centre, and very shortly comes to occupy a median position. The fibres composing this bundle would thus appear to be well protected. Why, then, do they suffer in this way? Gunn does not consider that for this result there is any one constant cause, but that several may contribute, one or another being of relatively greater importance in a given case. But before these are dealt with, it is pointed out by him that these particular fibres to which we are at present referring occupy a relatively large area, and further that their

function being highly specialised, any failure is immediately manifest. He thinks that there are three main causes at work: (1) It is at and about the centre that the most active lymph current flows in the optic nerve, and in that part of the nerve nearest to the globe the direction is towards the centre. This arrangement, admirably suitable when conditions are physiological, has grave disadvantages in presence of a pathological process. (2) The particular arrangement of the vascular supply is probably in a similar way a source of danger; for the central parts must necessarily be nourished from peripheral blood vessels, and thus the central parts will most readily suffer from any interference with the nutritive supply. Should any pathological process attack the arteria centralis, the terminal portion of the nerve, which is directly nourished through it, must necessarily suffer. (3) These fibres are the most active physiologically, and therefore most rapidly undergo the degenerative changes associated with such action; and when the surrounding conditions are unfavourable, the needful regenerative processes are imperfectly conducted. The nerve fibres then become unable to perform their function, and are apt to undergo a process of disintegration, unless relief comes in time.

It is not very easy to classify cases of retro-ocular neuritis in any way not liable to serious criticism. Gunn, as a starting-point, divides his cases into those in which the inflammation of the nerve has spread to it from surrounding tissues, and those in which the neuritis is primary. The first of these classes includes such cases as those in which orbital cellulitis or periostitis was first present, those which took their starting-point in abscess at the root of the teeth, and so on. The second great class he divides into two sub-classes, the first to include examples of local manifestation of a general disease, in particular gumma and tubercle; the second, a large and heterogeneous collection of all the "primary" cases. Of those which are placed in this group, influenza accounts for a good many, and disseminated sclerosis for more; gout, malaria, arterial disease, and shock are responsible for a number. Gunn relates the curious history of two sisters, each of whom passed through an attack of retro-ocular neuritis after revaccination. The quality of the lymph could hardly be held to be responsible for this curious occurrence, for they were not vaccinated at the same time, not even in the same year; it could only be held to be a striking example of family neuropathy. The whole paper is full of matters of high importance in regard to this affection of the optic nerve; we can only, however, notice one practical point more. In the class of "primary" neuritis there are considerably more women than men, and if one takes age into account as well, the disparity is seen to be specially marked between 20 and 30. More than one-third (seventy seven) of all Gunn's primary cases occurred in this decade, and of these seventy-seven patients, forty eight were women and twenty nine only were men. After the age of 40, on the other hand, more men are attacked than women, and this perhaps because shock, gout, and arterial disease are more prevalent among men. Comparison, then, with the incidence of insular sclerosis is very interesting.—*Ophth. Rev.*, London, 1905, October.

Diplococcus causing Hypopyon Ulcer of the Cornea.

The terrible results of pus-forming ulcer of the cornea, the condition which more than any other is responsible for the occurrence of loss of useful vision during the active period of life, are so serious, that any further information which will enable us to treat it with more uniform success must be considered a boon. The most usual cause, from the bacteriological point of view, is probably the pneumococcus; but it is well known that in a certain proportion of cases that organism is not present, while a diplococcus is. The clinical importance of this point is that the same line of treatment does not answer so well in the case of one of those organisms as in that of the other. Erdmann writes a valuable paper on thirty cases of diplobacillary hypopyon ulcer which have come under his supervision in Rostock. He does not agree with some others that the original ulcer is usually central; his experience has been that a marginal situation is more frequent, but in the more severe cases which he encountered, a central position was the more usual. An interesting little fact regarding the bacteriology is that he was able to obtain evidence that the organisms were very numerous in the deeper layers of the cornea round the ulcer, even in cases in which the secretions lying in the conjunctival sac hardly showed any growth. The fact of therapeutic value most necessary to bear in mind in connection with this matter of bacteriology, is that in the majority of cases an ordinary antiseptic application is indicated, but where the diplobacillus is present, zinc (which in the other cases is of little value, or may even be injurious) is certainly the best substance to apply. In the great majority of cases of diplobacillary conjunctivitis this organism can also be demonstrated in the nose, but it is also frequently present both in nose and in conjunctival sac without any reaction or ulceration in either place. Erdmann is not prepared to say whether the occurrence of the organism in the nose is primary or secondary. He gives numerous particulars in regard to the presence and behaviour of the germs, which are of great interest from a bacteriological point of view.—*Klin. Monatsbl. f. Augenh.*, Stuttgart, 1905, May.

New Eye Symptom in Exophthalmic Goitre.

Teillais believes that he has noticed a sign occurring in exophthalmic goitre with sufficient regularity to justify him in regarding it as a valuable diagnostic sign. This consists in an abnormal brownish pigmentation of the eyelids. The coloration affects the whole lids right up to the margin of the orbit, but the conjunctiva is never affected, nor does the colour penetrate below the skin. He considers the occurrence of this sign to afford support to that view of the pathology of the condition which regards Graves' disease as having its origin in an error of the thyroid gland rather than in any nerve lesion, whether bulbar or sympathetic.—*Arch. d'opht.*, Paris, 1905, May.

REPORTS OF THE MEDICAL SOCIETIES.

EDINBURGH MEDICO-CHIRURGICAL SOCIETY.—The opening meeting of the session was held on Wednesday, November 1, 1905, Professor CHIENE, C.B., President, in the chair.—Mr. STILES showed several patients, and Drs. SHENNAN, BRUCE, M'DONALD, PIRIE, and Messrs. STILES and MILES showed specimens and photographs.—The office-bearers elected for the ensuing year were—Dr. Affleck, President; Dr. Lovell Gulland and Mr. David Wallace, Secretaries; Dr. William Craig, Editor of *Transactions*; and Dr. Harvey Littlejohn, Treasurer. —The retiring President delivered his Valedictory Address. He did not intend, he said, to follow the usual custom and give a résumé of the work of the Society during his term of office. That work was too recent for him to form a just estimate of its value. He proposed, therefore, to go back fifty years in the history of the Society, and give them a short account of the Society and its members at that time—the year 1855. He then gave a most interesting account of the officials of the Society, and of the prominent men in its ranks, recalling the fact that Dr. H. D. (now Sir Henry) Littlejohn was one of the Council, and also editor of the *Edinburgh Medical Journal*. Among others referred to was Warburton Begbie, whose short and brilliant career was commented on. Photography and the binaural stethoscope were introduced about this period. The open-air treatment of tubercle was advocated, but condemned. In conclusion, he referred to the Eastern practice of ancestor-worship, and said that members of the medical profession might, with much advantage to themselves, study the lives and works of those who, in the years gone by, had done so much good work, unaided by the many inventions and aids to diagnosis and treatment which exist at the present day.—A paper entitled "Some Observations on the Use of the Opsonic Index of the Blood in the Diagnosis and Treatment of Pulmonary Tuberculosis," by Drs. LAWSON and STEWART, was read by Dr. Lawson. Opsonines are substances which promote phagocytosis by rendering the bacilli more palatable. These opsonines occur in the blood serum. To obtain the opsonic index, a small quantity of the blood is taken, allowed to clot, and centrifugalised: the serum containing the opsonines is thus obtained. Another portion of blood is taken and immediately mixed with normal saline solution to prevent its clotting. The mixture is then centrifugalised, and thus three layers are obtained—a layer of red corpuscles at the foot, then a layer of white corpuscles, and an upper fluid layer. This fluid part is removed. Equal parts of the serum obtained from the first portion of blood, of the white blood corpuscles, and of a solution containing tubercle bacilli, are mixed in a tube, and this is placed in an incubator for fifteen hours. At the end of that time the number of bacilli in thirty leucocytes is counted and the average taken. A similar process is gone through with healthy blood, and the two resulting figures give the opsonic index. The range of health is 0·9 to 1·2; below 0·9 is an indicative of tubercle, as is also a very high index. The

administration of tuberculin (TR) causes a rise in the index in health. In tuberculous cases it causes an immediate fall. This fall or negative phase persists for a certain time, and is followed by a gradual rise to a higher level than before. Tuberculin should not be given during the negative phase, but only during the rise which follows. Previous failures with tuberculin may be due to its being given during the negative phase. With the opsonic index to guide one, success with the tuberculin treatment is now much more certain. There is no definite correspondence between temperature rise and pulse disturbance and the negative phase. It is necessary, therefore, to test the opsonic index at frequent intervals, to make sure when the negative phase has passed off, and when one may with safety administer succeeding doses of tuberculin.

Edinburgh Obstetrical Society.—*November* 8, 1905.—Professor Simpson and afterwards Dr. J. W. Ballantyne in the chair.—The following were elected office-bearers for the year:—*President*—Dr. J. W. Ballantyne. *Vice-Presidents—Senior*—Professor Sir Halliday Croom; *Junior*—Dr. Berry Hart. *Treasurer*—Dr. William Craig. *Secretaries*—Drs. Lamond Lackie and Barbour Simpson. *Librarian*—Dr. Haultain. *Editor of Transactions*—Dr. Angus Macdonald. *Members of Council*—Professor Simpson, Drs. W. Fordyce, Thomas Wood (Leith), Oliphant Nicholson, N. T. Brewis, Munro Kerr, Freeland Barbour, Haig Ferguson.—Dr. Freeland Barbour read a "Note on Exomphalos as causing delay in the Second Stage." The patient was a 4-para and suffered from hydramnios and accidental hæmorrhage during her pregnancy. The labour was very difficult and tedious, owing to the obstruction offered by a mass which could be felt on the abdominal wall. This proved to be a marked exomphalos.—Dr. B. P. Watson read a paper on "Removal of the Liquor Amnii, a Cause of Death of the Fœtus and Changes in the Placenta." The paper embodied the results of an experimental investigation which Dr. Watson had carried out on rabbits. The effects of removal of the liquor amnii in the early stages of pregnancy were—(1) Death of the fœtus and degeneration of tissues; (2) changes in the placenta; (3) arrested secretion of liquor amnii.

Glasgow Pathological and Clinical Society.—*November* 13, 1905.—The President, Professor Robert Muir, in the chair.—Specimens were shown by Dr. Renton and by Dr. James Hamilton.—Dr. James H. Nicoll showed—(*a*) Several patients from a further series of cases of hernia of the ovary in infants. He had seen in all thirty-five cases, in thirty of which the diagnosis was verified by operation. In his present series of cases he was able to deal with the condition without removing the ovary. Reference was also made to his former cases (*Glasgow Medical Journal*, October 1905), and to the diagnosis and treatment of this condition. (*b*) Several patterns of cystoscope. (*c*) Lantern slides of the steps of an operation for the radical removal of penile carcinoma.—Dr. Freeland Fergus read notes of a case of conjunctival tuberculosis, which occurred in a child æt. 6. There was a minute ulcer in the upper fornix of the right eye, with accompanying slight granulations at its margin, and enlargement of the pre-auricular

and one of the cervical glands. The whole of the affected tissue was excised, together with the involved glands, and the wound healed perfectly. Six months later the child was in excellent health.—Dr. JAMES HAMILTON read notes of a case of cerebro-spinal meningitis, and Dr. JOHN ANDERSON showed microscopical preparations from same. The patient was a young man, æt. 24, whose illness, of three weeks' duration, presented the features of a sporadic case of cerebro-spinal meningitis. The fluid from lumbar puncture and the subsequent autopsy showed the infection to be pneumococcal in character.

GLASGOW MEDICO-CHIRURGICAL SOCIETY.—November 17, 1905.—Dr. G. WALKER DOWNIE showed—(*a*) A man on whom he performed œsophagotomy for the removal of a tooth-plate which had become impacted in the gullet. (*b*) A patient who had sarcoma (round-celled) of both tonsils: both tumours were enucleated along with infected glands from each side of the neck. These were exhibited, and microscopic preparations were also shown.—Dr. A. A. GRAY gave a lantern demonstration upon "Some Pathological Conditions found in the Inner Ear," with special reference to the clinical phenomena associated with these conditions. Specimens were exhibited.—Dr. W. W. CHRISTIE read a short paper upon "The Use of Stovaine as a Local Anæsthetic in Throat and Nose Operations."

FORFARSHIRE MEDICAL ASSOCIATION.—*November* 2, 1905.—Dr. D. LENNOX, Vice-President in the chair.—Dr. S. Y. ROGERS showed a case of Raynaud's disease in a man, æt. 37. He had been seven years in India, and returned to this country in 1903. In 1898 he suffered from ague, and in 1900 he had syphilis. During April 1903 he was ill with bronchiectasis, and in the winter of 1904 he was attacked with Raynaud's disease. His ears became cold and benumbed, then bluish-red in colour, then a portion of the helix of both ears sloughed, the left more than the right. He had no trouble with his hands or feet till three weeks after.—Dr. G. PIRIE showed two patients who had been treated with X-rays. The first had lupus of the ala of nose, spreading to the cheek and lip, of a few weeks' duration. The second showed lupus of the cheek of four years' duration. Each had twenty exposures during a period of six weeks, and both developed an acute dermatitis. When this had subsided, the lupus was gone in the first case, and there was a great improvement in the second case. Dr. Pirie then exhibited a series of X-ray photographs, which included a myosteoma of the upper arm due to an injury two years ago, and several other abnormal conditions of bones.—Dr. R. C. BUIST read a few notes on the treatment of asphyxia neonatorum, in which he stated that the recovery of two cases of asphyxia during the past summer had impressed him with the fact that the prognosis was now better with present management than formerly. He recommended the following procedure. After clearing the mouth and making sure that no obstruction existed to respiration—(1) Compress the chest manually so as to force the blood to the heart, and thus stimulate direct contraction of that organ; (2) rhythmic traction on the tongue with forceps; (3) inflation of lungs with catheter; (4) artificial respiration, by his own method.

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